REVERSING THE
U.S. MATERNAL MORTALITY CRISIS

A Report of the Aspen Health Strategy Group

HEALTH
STRATEGY GROUP
aspen institute

Foreword by Kathleen Sebelius and Tommy G. Thompson

Edited by Alan R. Weil and Alexandra J. Reichert

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The mission of the **Aspen Health Strategy Group** is to promote improvements in policy and practice by providing leadership on important and complex health issues. The group is comprised of 23 senior leaders across influential sectors including health, business, media, and technology, and is part of the Health, Medicine and Society Program at the Aspen Institute. Co-chaired by Kathleen Sebelius and Tommy G. Thompson, both former governors and former U.S. Secretaries of Health and Human Services, the Aspen Health Strategy Group tackles one health issue annually through a year-long, in-depth study. This compilation is a collection of papers on the group's fifth subject: maternal morbidity and mortality. The papers provide an overview of the crisis and address related topics on the U.S. maternity care system, racism and racial inequity in affecting maternal health outcomes, and the role of Medicaid in both understanding and tackling the problem. It also includes a final consensus report based on the group's work.

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Tommy G. Thompson, 19th U.S. Secretary of Health and Human Services (2001-2005); former Governor, State of Wisconsin (1987-2001)

MEMBERS PARTICIPATING IN THIS REPORT

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Richard Baron, President and CEO, American Board of Internal Medicine

Richard Besser, President and CEO, Robert Wood Johnson Foundation

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Paul Ginsburg, Professor of Health Policy and Director of Public Policy, Schaeffer Center for Health Policy and Economics, University of Southern California; Director, USC-Brookings Schaeffer Initiative for Health Policy; Leonard D. Schaeffer Chair in Health Policy Studies, The Brookings Institution

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David J. Skorton, President and CEO, Association of American Medical Colleges

Arne Sorenson, President and CEO, Marriott International, Inc.

Andy Stern, President Emeritus, SEIU

Jeff Thompson, Executive Advisor and CEO Emeritus, Gundersen Health System

Antonia Villarruel, Dean, University of Pennsylvania School of Nursing

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Sylvia Mathews Burwell, President, American University, 22nd U.S. Secretary of Health and Human Services (2014-2017)

Michael O. Leavitt, Founder, Leavitt Partners; 20th U.S. Secretary of Health and Human Services (2005-2009)

Donna Shalala, Member, U.S. House of Representatives (FL-27); 18th U.S. Secretary of Health and Human Services (1993-2001) (on leave)

Louis W. Sullivan, Chair, Sullivan Alliance to Transform America's Health Professions, Association of Academic Health Centers; 17th U.S. Secretary of Health and Human Services (1989-1993)

David Mathews, President and CEO, Kettering Foundation; 11th U.S. Secretary of Health, Education and Welfare (1975-1977)

STAFF

Alan R. Weil, Editor-in-Chief, *Health Affairs*

Alexandra Reichert, Research Assistant, Georgetown University Center for Global Health Science and Security; Former Coordinator, *Health Affairs*

Ruth J. Katz, Vice President and Executive Director, Health, Medicine & Society Program, The Aspen Institute

Katya Wanzer, Senior Program Associate, Health, Medicine & Society Program, The Aspen Institute

April 2021

It is again my pleasure to introduce the annual report of the Aspen Health Strategy Group (AHSG), the fifth since was it was established in 2015 to tackle some of the most pressing health challenges facing the United States in the 21st century.

None is more important than the topic members chose for study in 2020—maternal mortality. The U.S. has the highest maternal mortality rate of any high-resource country in the world and, with the exception of Afghanistan and Sudan, it is the only nation where that rate is rising. Black women are three times more likely to die in childbirth than White women in America. While the reasons behind these statistics are complex, they are categorically unacceptable; indeed inexcusable.

The Aspen Health Strategy Group is housed within the Aspen Institute's Health, Medicine & Society Program. Members include innovative leaders of major corporations, health systems, professional organizations, and foundations, as well as academic experts. Since its inception, AHSG has been led by Kathleen Sebelius and Tommy Thompson, who have both served as U.S. secretaries of health and human services and as state governors.

We thank all of them deeply for lending their talent, wisdom, and experience to this latest effort.

A word of special appreciation goes to Tommy who, with the publication of this report, ends his five years of service with the Aspen Health Strategy Group. A good friend of the Aspen Institute, Tommy helped to shape and launch the AHSG in 2015 and has co-led it ever since with enthusiasm, integrity, and a commitment to making a difference. We are forever grateful and look forward to welcoming Tommy back to campus as an ex officio AHSG member.

At the same time, we welcome former Senate Majority Leader Bill Frist as our new co-chair. Bill is also a long-time colleague of the Aspen Institute and will undoubtedly enrich the group's annual convenings with his own background and knowledge. We are thrilled to have Bill on board and eager to work together in the years ahead.

As always, the Aspen Health Strategy Group honors the Aspen Institute's core principles of non-partisanship and respect for evidence, as well as its reputation for bringing together great thinkers and doers. The members' insights and ideas for addressing the country's maternal mortality crisis are well captured in this report, which sounds an explicit call to action. We encourage policymakers and others with the influence and authority to help end this crisis to take up the charge.

Dan Porterfield
President and CEO
The Aspen Institute

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Kathleen Sebelius
AHSG Co-Chair

Tommy G. Thompson
AHSG Co-Chair

2020 marks our fifth year as co-chairs of the Aspen Health Strategy Group whose work continues to promote improvements in policy and practice by providing leadership on difficult and complex health issues. In taking on the challenge of maternity mortality in the United States, this work has never been more important or consequential, or more timely.

The rates of maternal mortality and morbidity in the U.S. are both astounding and disturbing. In the United States, approximately 700 women die each year as a result of pregnancy or delivery complications. An additional 50,000 women each year face short or long-term severe consequences to their health as an outcome of pregnancy or labor, including luminaries such as Serena Williams and Beyonce. Black women have three to four times the risk of pregnancy-related deaths as White women. Both maternal mortality and severe morbidity have been steadily increasing over the past years. And attention has been growing to wide racial and ethnic disparities in maternal health outcomes as well as gaps in maternity care services in many communities, particularly rural areas.

The Aspen Health Strategy Group met in October 2020 -- in virtual format, later in the year, and for a shorter time than our usual schedule because of the COVID pandemic -- to take on hard questions related to the maternal mortality crisis and to develop a portfolio of big ideas or recommendations to address it. Despite these limitations, the resulting work is as rich, thoughtful, and potentially impactful as any produced by the Group. We are pleased to present that work in this report.

As we have done each year, the 2020 AHSG report includes five big ideas on how to tackle the problem of maternal mortality and morbidity. In developing these ideas, we relied heavily on four white papers, prepared by subject matter experts. Andreea Creanga provided background and data on maternal mortality in the U.S. The U.S. maternity care system was described and analyzed by Eugene Declercq. Joia Crear-Perry, Inas Mahdi and Carmen Green discussed racism and racial inequity in affecting maternal health outcomes. And Jennifer Moore and Karen Dale focused on the role of Medicaid both in understanding the problem and potentially helping to solve it. Each of these papers is included as part of this report as well.

We were fortunate to have the authors join us for our virtual convening to elaborate on their papers and provide their expertise. In addition, we heard from Congresswoman Lauren Underwood of the State of Illinois, co-chair of the U.S. House of Representatives' Black Maternal Health Caucus, who shared her own work related to maternal maternity and morbidity. We benefited as well from the submission of more than a dozen big ideas proposed by the public.

We are also very appreciative of the Robert Wood Johnson Foundation and the Laurie M. Tisch Illumination Fund for their generous financial support of the Aspen Health Strategy Group. Both organizations have been with AHSG from the start. Their funding has been crucial in AHSG's cementing its reputation as one of *the* places to examine some of America's most pressing health problems. As always, however, we note that the perspectives expressed in this report are those of the authors and do not necessarily reflect the views of either organization.

On behalf of the Aspen Health Strategy Group, we thank our funders and those individuals who participated in and otherwise contributed to our 2020 program. We are most grateful to them all.

AHSG Co-Chairs

Dedication

This report is dedicated to Arne M. Sorenson, whose wisdom and knowledge greatly enriched the Aspen Health Strategy Group since its inception. As president and CEO of Marriott International, Arne understood that business interests are enriched by a commitment to diversity, equity, inclusion, and environmental sustainability.

We will miss his visionary leadership.

Arne M. Sorenson
AHSG Member, 2016 - 2020

ASPEN HEALTH STRATEGY GROUP REPORT

**Five Big Ideas on Reversing
the U.S. Maternal Mortality Crisis**

Part 1

"The data regarding maternal mortality and morbidity in the United States are devastating… As a nation, we can, and we must, do better."

— THE ASPEN HEALTH STRATEGY GROUP

# Five Big Ideas on Reversing the U.S. Maternal Mortality Crisis

Introduction

The United States has the highest maternal mortality rate of any high-income nation in the world. According to the World Health Organization (WHO), in 2017 there were 17.4 maternal deaths for every 100,000 births in the United States (World Health Organization, 2019). The high-income country with the next highest rate was South Korea, with 11 maternal deaths per 100,000 births. While rates are declining in other high-income countries, the U.S. maternal mortality rate has risen steadily since 1987, when it was 7.2 per 100,000 births (Centers for Disease Control and Prevention, 2020a).

Maternal mortality, defined by the Centers for Disease Control and Prevention (CDC) as the death of a woman while pregnant or within one year of the end of pregnancy from any cause related to or aggravated by the pregnancy, is a key measure of health system performance. For every maternal death in the United States, there are almost 100 instances of severe maternal morbidity, defined as unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health. The U.S. infant mortality rate of 5.8 deaths in the first year of life per 1,000 live births in 2017 places the nation worst among 10 comparison countries. Poor U.S. performance in maternal mortality, severe maternal morbidity, and infant mortality all provide evidence of a system failing to meet the needs of pregnant and birthing people.[1]

Maternal mortality in the United States disproportionately affects Black and American Indian / Alaskan Native birthing people. The CDC reports that, based on 2018 data, Black women die from pregnancy-related complications at three to four times the rate of non-Hispanic White women (37.3 deaths per 100,000 births compared to 14.9 deaths per 100,000 births; Centers for Disease Control and Prevention, 2020a). The 2014–2017 rates were 28.3 for American Indian / Alaskan Native women, 11.6 for

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1 We acknowledge that language regarding gender is in flux, especially as it relates to women's health and maternal health. Pregnancy and childbirth occur among people who are biologically female whose gender identity may or may not be that of a woman. Terms such as "birthing person" are more inclusive than "pregnant woman," yet most data continue to be collected and reported with traditional terms. This report uses a combination of gendered and gender-neutral terms.
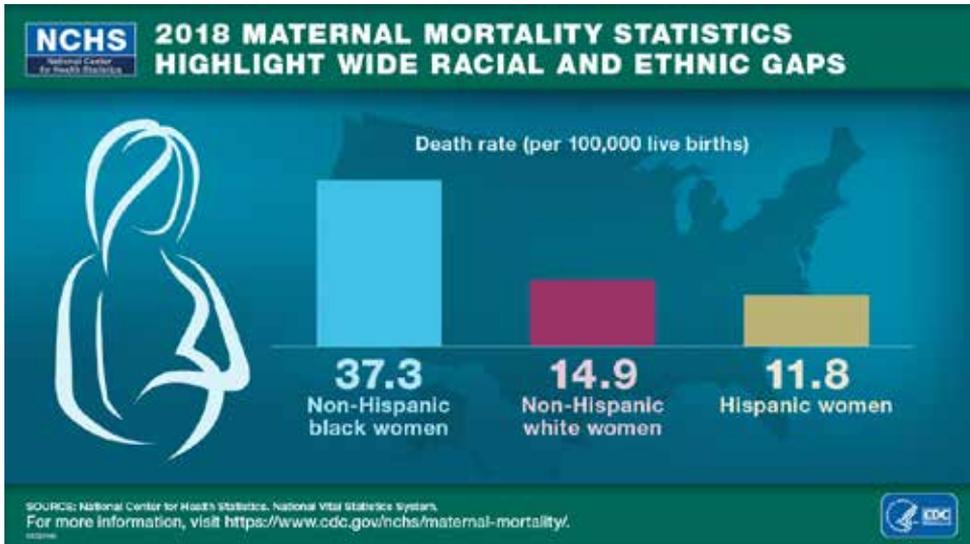
Hispanic women of any race, and 13.8 for Asian or Pacific Islander women (Centers for Disease Control and Prevention, 2020b).

The Aspen Health Strategy Group selected maternal mortality as its topic for 2020, its fifth year of work. Due to the COVID-19 pandemic, the multisectoral group of leaders met virtually this year, discussing the topic with the assistance of subject-matter experts who prepared background papers to inform the discussion. The group emerged with five big ideas to tackle maternal mortality.

The Aspen Health Strategy Group's goal is to promote improvements in health policy and practice by providing leadership, ideas, and direction on important and complex health issues. Co-chaired by Kathleen Sebelius and Tommy Thompson, both former governors and former U.S. secretaries of health and human services, the group is composed of 23 senior leaders across sectors including health, business, media, and technology. More information about the Aspen Health Strategy Group can be found on the Aspen Institute website (www.aspeninstitute/aspen-health-strategy-group. org). This report captures the conversations of the group, but no specific section or statement in the report should be considered to represent the opinion of any individual group member.

Background

Our work builds upon four papers prepared by subject-matter experts in advance of our meeting. These papers are published in conjunction with our report. Data and conclusions that appear in our report without citation are drawn from these papers.

"Reducing maternal mortality is a national emergency in the United States," writes Andreea Creanga of Johns Hopkins University in "Understanding Maternal Mortality in the United States" (2020). In addition to its high maternal mortality rate, of the 44 countries included in the United Nations Population Division (UNPD) "more developed" regions, only the United States had a sizeable increase in the rate of maternal mortality from 2000 to 2017. Creanga notes, "Maternal mortality is used around the world as a marker of population health, health inequalities, and health system functioning."

The United States has significant gaps in data related to maternal mortality. Until recently, there has been no federal mandate for hospitals to report maternal deaths to any federal agency or central repository, and hospitals were not required to investigate maternal deaths. Only two-thirds of U.S. states have multidisciplinary maternal mortality review committees (MMRCs) recognized by the CDC that review each maternal death (Kozhimannil et al., 2019). Information collected on the death certificate varies by state, is often incomplete, and has changed over time. Given these limitations, it is difficult to know with confidence whether reported increases in maternal mortality reflect real changes or more complete reporting.

What do women die of? "Cardiovascular conditions, hemorrhage, infection, embolism, preeclampsia/eclampsia, and mental health conditions accounted for nearly 75% of pregnancy-related deaths," says Creanga, with causes varying by race and ethnicity. The risk of maternal death increases with age; significant risk factors are low income, low education level, and unmarried status for non-Hispanic Black women.

Many, but not all, maternal deaths are preventable. Based on data from MMRCs, of the 78% of pregnancy-related deaths where a preventability determination was possible, 65.8% were judged to be preventable.

Eugene Declercq of Boston University points out that "the rise in maternal mortality in the United States from the 1990s to 2010s was not the result of any single factor, but rather a predictable result of wider failures in medicine, public health, and social services." His paper, "The U.S. Maternity Care System and Maternal Mortality" (2020), describes where and from whom women receive care.

The vast majority of women in the United States give birth in a hospital where care by obstetricians predominates. There are only one-third as many midwives per capita in the United States as in other high-income countries. The medical model of maternity care is one factor in the 60% growth rate in cesarean births between 1996 and 2009 to a rate currently in excess of 30%, despite a WHO recommendation of a rate between 10% and 15% (World Health Organization, 2015). Small but growing numbers of women using freestanding birth centers offer just one reflection of dissatisfaction with the dominant systems of care.

To improve maternal mortality, we need to reconceptualize maternal health as part of the broader continuum of women's health, Declercq argues. Investing in community-based maternity care, group prenatal care, and community health centers will help support birthing people before and after birth, where "one-third [of deaths] occur during pregnancy and one-third between a week and a year after birth."

Joia Crear-Perry and coauthors at the National Birth Equity Collaborative elaborate on the widespread racial disparities in the maternal health system, arguing, "We cannot separate maternal mortality and morbidity from the inequitable systems from which they arise." Their paper, "Roots of Inequity in Maternal Mortality" (2020),

presents a "Reproductive Justice" framework to address the systemic racism embedded within the U.S. maternity care system. Acknowledging that maternal mortality rates are also very high for American Indian / Alaskan Native birthing people, Crear-Perry and coauthors focus their analysis on Black women and anti-Black racism.

The legacy of using Black women's bodies for their reproductive capacity to produce more "property" for their owners lingered after the abolition of slavery, with forced sterilization campaigns, medical experimentation, and medical mistreatment. Black midwives played a key role in birth practices in the early years of the United States. However, as birth became medicalized and medicine became professionalized in the 1900s, midwives were driven from practice, with consequences that persist today.

Racism manifests in myriad ways. According to Crear-Perry, "Black women report having their concerns about their health care dismissed, their experiences of perceived racism challenged, and feeling punished when attempting to confront power structures within health care systems." Racism not only affects the quality of care received, but also elicits a stress response within women's bodies that can put women at higher risk of infection, early onset of labor, preterm birth, or low birth weight.

Crear-Perry describes what the Reproductive Justice framework would look like in practice. In order to achieve birth equity, health leaders and organizations must critically analyze "methods, funding, programming, and internal and external facing policies." Some of the principles include: listening to Black women, disentangling care practices from the racist beliefs in modern medicine, empowering and investing in paraprofessionals, and recognizing that access does not equal quality care.

Jennifer Moore of the Institute for Medicaid Innovation and Karen Dale of AmeriHealth Caritas describe the key role that Medicaid plays in the maternal health system in their paper, "Medicaid and Maternal Health: A National Crisis at the Intersection of Health Systems and Structural Racism" (2020). Medicaid covers nearly half of all births in the United States, with the share by state ranging between 20% and 71%. Medicaid-covered deliveries have a 1.4 times higher rate of severe maternal
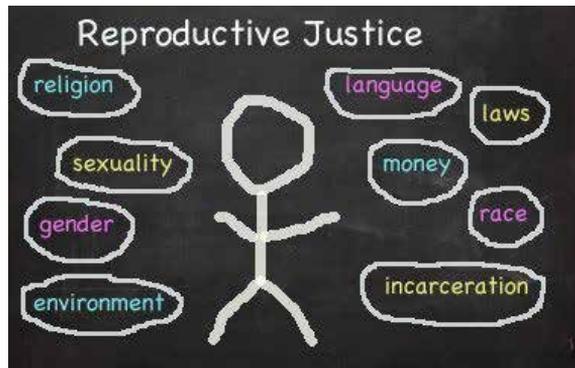
morbidity than those covered by commercial insurance. Yet, among deliveries to Black women, the rate of severe morbidity is the same for those covered by Medicaid and commercial insurance.

Moore and Dale explain the intersection of risk factors that women enrolled in Medicaid face, including unstable insurance coverage, unmet social needs, and poorly designed care models. Depending upon the eligibility policies of the state where she lives, even the poorest woman may be ineligible for Medicaid, gain coverage only when she becomes pregnant, and have that coverage end 60 days postpartum. While Medicaid covers maternity care services, payment rates and the network of providers are set by the states or contracted managed care organizations.

According to Moore and Dale, Black and Hispanic women are more likely to be uninsured or enrolled in Medicaid, "have limited or no access to midwifery-led care, lack community-based support such as doulas, deliver at a hospital with worse quality of care, face individual-level stressors such as racism in the clinical setting, or be affected by the accumulation of such discrimination, racism, and stressors over their lifetimes."

Midwifery-led care and freestanding birth centers are two models with significant evidence, as outlined by Moore and Dale, demonstrating that they can reduce maternal mortality and morbidity, providing high-quality, patient-centered, accessible care for the vast majority of pregnancies, which are low risk. Yet significant barriers within the Medicaid program and related state laws and regulations limit the adoption of these models. In order for Medicaid to reach its potential in addressing the maternal mortality crisis, it must emerge from historical policies, many of which have racist origins, and be reimagined around women's health needs.

Framing the Issue

Five themes emerged in the group's discussion that helped guide the development of this year's big ideas. The themes are as follows:

- **Better outcomes are within reach**

    The data regarding maternal mortality and morbidity in the United States are devastating. As Creanga (2020) sets forth in detail, we are an international outlier among high-income countries, with mortality and morbidity rates that far exceed those of other nations. We are the only high-income country experiencing growing rates of mortality and severe morbidity. The best estimates are that about two-thirds of U.S. maternal deaths are preventable.

    The burden of the crisis falls on families, shattered by a maternal death, while loved ones and communities are left to pick up the pieces after a tragedy. The sustained level of excess deaths among Black people reflects and adds to the accumulated burdens of racism, creating yet another form of stress during pregnancy and birth.

    Lower rates of maternal mortality in other countries provide strong evidence that this crisis can be addressed. Countries that have built their maternity care systems around women's needs have shown what is possible. Countries that provide stable health insurance, have a strong social safety net, and embrace midwifery-led models as the standard of maternity care are able to reduce the risk factors associated with maternal mortality.

    The experience in California, where maternal mortality rates declined by more than half between 2006 and 2013, demonstrates that a collaborative and comprehensive response to the crisis can yield positive results. California's efforts focused on creation of and adherence to evidence-based clinical care pathways. Maternal mortality rates in California are now comparable to rates in other high-income countries (California Maternal Quality Care Collaborative, n.d.). However, the gap between maternal mortality rates for non-Hispanic Blacks and non-Hispanic Whites remains unchanged (Main, Markow, and Gould, 2018).

    Declercq (2020) notes that our hospital-centric maternity care system has invested in quality improvement efforts within the hospital, with positive results for maternal outcomes in that setting. The challenge is to make the same type of effort and invest similar resources in other sites of care and in the community.

    As a nation, we can, and we must, do better.

- **The medical model of birth does not meet women's needs**

Pregnancy and birth are natural events, but in the United States we treat them as if they are medical problems to be solved. We bring the entire medical armamentarium to each pregnancy. We overdiagnose and overtreat. As in the rest of American medicine, we readily pay for high-cost acute services while we undertreat the chronic medical and social conditions that are the source of most harm.

Even though only a very small share of births are high risk, we treat every birth as if it were. As Declercq points out, this drives us to a system reliant upon highly trained physicians and technology-laden hospitals. Our technology-based medical care system pays insufficient attention to aspects of care that are necessary for achieving good maternal outcomes. Missing elements include engagement with the birthing person's family and social supports, education regarding when to seek care and poor responses when care is sought, poor coordination across care providers, and language and cultural discordance between providers and patients.

We know from other countries that midwifery-led models of care have as good or better outcomes, reduce overall costs of care, and better meet the needs and preferences of most women. Licensed and certified midwives can be trained

in much less time than physician specialists, typically between two and four years, depending on the level of certification. Yet we have almost eliminated this model in the United States. As Declercq (2020) argues, the United States has seen a recent resurgence in the use of freestanding birth centers and midwifery care as a reaction to the mismatch between what the dominant models of care offer and what most women want. However, use of these services remains limited, and they are often available only to higher-income women who can afford to pay for them outside of the insurance system.

- **Racism and racist policies are at the root of the maternal mortality crisis**

The burden of the U.S. maternal care system falls most heavily on Black and Indigenous people, families, and communities. While racial disparities exist in much of health care, the scale of those disparities is particularly dramatic, and damning, when it comes to maternal mortality. As demonstrated in the CDC and

WHO data, Black women die at a rate three to four times that of White women or Hispanic women of any race, and Indigenous women die at a rate two to three times that of White women or Hispanic women of any race. While the maternal mortality rate of White women in the United States is worse than the rate in most other high-income countries, the crisis is far deeper for Black and Indigenous women than for others.

Racial disparities are rooted in policies dating back to before the founding of our nation. Science and medicine defined racial differences as biologically based, justifying all manner of mistreatment, neglect, and harm. Legally sanctioned racial segregation of medical providers was common until the middle of the 20th century, and although outlawed today, racial segregation persists due to continuity in residential patterns and lower rates of payment for providers serving disproportionate numbers of Black and Hispanic patients.

Maternity care has been directly affected by racism-based policies. As Crear-Perry et al. outline (2020), Black midwives, the primary source of maternity care for Black women, were regulated out of existence due to racist assumptions regarding their quality and competence. From the inception of the Medicaid program in 1965 through welfare reform in 1996, eligibility was tied to receipt of cash assistance. Eligibility was determined by the states, resulting in very low income-eligibility thresholds designed to keep primarily Black domestic workers as a cheap source of labor. The Supreme Court's *NFIB v. Sebelius* decision (2012), which upheld the Affordable Care Act (ACA), made Medicaid expansion a state decision, with the result that states with large Black populations disproportionately chose to leave poor people without coverage.

The primary barriers to health, including healthy birth, relate to social disadvantage: poverty, inflexible jobs, limited access to prenatal care, unhealthy diets, and the like. The higher rates of these risk factors among Black women are the direct result of centuries of racist policies limiting access to jobs, housing, education, and more.

Yet the data show that, even after controlling for age, income, and other risk factors, Black women have higher maternal mortality rates than White women.

This points to the role of present-day racism as a primary cause of maternal mortality. Racism in the medical system can manifest in myriad ways. Doctors who dismiss Black women's symptoms, health systems that tolerate racist behaviors and assumptions that lead to Black women not receiving needed care, and the funneling of Black women into lower-quality health systems all contribute to the current racial disparities we experience in maternal mortality.

Understanding poor outcomes for Black pregnant women also requires understanding the concept of intersectionality (Crenshaw, 1989). The burdens of racism intersect with other forms of discrimination, such as those based on immigration status, preferred language, gender identity, and education levels. Each of these forms of discrimination yields harm, and they combine to exacerbate their individual effects.

- **Payment and regulatory structures overemphasize the medical model**

    In maternity care, what we pay for and don't pay for shapes the types of care that women receive.

    The financing system begins with insurance. While almost all women have insurance at the time they give birth, many women are uninsured at the time of conception and only gain coverage when they arrive at a clinician's office seeking prenatal services. This leaves women with untreated medical conditions when they conceive and may cause them to delay obtaining prenatal care due to misplaced financial concerns. Prior to the ACA, many individual insurance policies excluded pregnancy-related services, so women were only covered if they obtained Medicaid coverage when becoming pregnant (Lee et al., 2020).

    After they give birth, women covered by Medicaid lose their coverage in 60 days unless they are eligible for other reasons. The ACA's Medicaid coverage expansion provides continuity for people with incomes below 133% of the federal poverty level before and after giving birth, but this coverage does not exist in states that declined to expand Medicaid. Those with incomes above that threshold may be eligible for ACA subsidies, but that does not guarantee that they will obtain coverage. With approximately 12% of maternal deaths occurring 42 days or

more after giving birth, this loss of coverage likely contributes to the maternal mortality crisis.

Having health insurance provides financial protection for pregnant women but can also shape the type of care they receive in ways that are not optimal for their health. Financial incentives consistently favor the use of more intense and complex medical services. Hospitals are paid more for a c-section than a vaginal birth. Premature births that result in a neonatal intensive care unit stay for the baby are a significant source of income for hospitals (Lantos, 2010). Payment that flows to a hospital or physician may or may not make its way to the nurse-midwife who provides prenatal and postpartum care in addition to supporting the birth and care of the woman. At the time the patient receives care, these financial incentives may not be on the clinician's mind, but in the aggregate, they shape organizational policies, investments, and usual patterns of care.

The highly resourced medical sector obtains payment for maternity care services, but there is no payment model for social interventions that can dramatically reduce the risk associated with pregnancy and birth. The health care system has no formal place for doulas and perinatal community health workers. Health insurance does not cover stable housing, nutrition, time off from work to attend to one's health, or other supports. Some innovative payment models for maternity care create flexibility and modest incentives for health systems to redirect resources to social needs, but these are the exception, not the rule.

- **High rates of maternal mortality reflect our limited investment in women's health**

  High rates of maternal mortality and severe morbidity in the United States are a symptom of a larger problem: lack of investment in or attention to women's health as a whole. We cannot reduce maternal mortality rates without improving women's health and health care throughout their lives.

  The lack of investment is demonstrated in myriad ways. We fail to provide health insurance to low-income women leading up to pregnancy, we tolerate discontinuities in coverage during pregnancy, and we terminate coverage shortly after a

woman gives birth. Pregnancy qualifies low-income women for Medicaid coverage, but there is no continuity across their lifespan. Prior to enactment of the ACA we allowed the sale of insurance policies that excluded maternity coverage; we also allowed insurers to charge higher premiums to women than to men (Lee et al., 2020)

We underinvest in research regarding the primary disease burdens affecting women; we often exclude women, and certainly pregnant women, from clinical trials. While caution is warranted, it limits the evidence we have regarding safe and effective treatments during a critical period of many women's lives. We have diverted our attention from the ongoing opioid epidemic because of the COVID-19 pandemic, even as substance use disorders remain a leading cause of maternal mortality.

The United States stands alone among high-income countries in having no national policy regarding paid maternity leave, with this benefit available primarily to higher-income women. The United States also stands alone in placing the financial and logistical burden of finding child care, particularly for infants, almost entirely on the family. Our nation has historically had no policy regarding home visits for postpartum women and newborns, with the ACA modestly expanding these programs. The United States has no guaranteed income or stipend for families with newborns. This combination of policies, or absence of policies, places great financial and social strain on families, and women in particular.

Ultimately, the nation's high maternal mortality rate is a subset of a broader phenomenon: the increasing death rate for U.S. women ages 25 to 34 in the period from 2010 to 2018 due to a variety of causes (Declercq, 2020, August 7). Maternal health is women's health, and the United States performs poorly on both.

Five Big Ideas to Reverse U.S. Maternal Mortality

It is past time to tackle the maternal mortality crisis. The Aspen Health Strategy Group offers five big ideas to reverse our current negative trends.

1. Make a national commitment to improvement

The nation's rates of maternal mortality and morbidity far exceed what is achievable in a country with our resources. Maternal mortality is a national crisis that warrants a national response, yet each birth occurs in a specific place with women receiving care from individual providers. An effective approach to addressing this crisis must bring together the public sector at all levels of government and the private sector within and outside of health care.

A national commitment begins with ambitious national goals. The U.S. Department of Health and Human Services should reexamine the Healthy People 2030 Goal of reducing the maternal mortality rate to 15.7 deaths per 100,000 live births. The new goal should be more ambitious, intended to bring our rate down to the level of other high-income countries and to close the glaring gap in maternal mortality rates between Black and Indigenous women and White, Hispanic, and Asian women.

The federal government should commit to annual reporting of maternal mortality rates using consistent methods to measure progress against these goals.

In support of these goals, the Center for Medicare and Medicaid Innovation (CMMI) should establish challenge grants for states that adopt a suite of policies related to insurance coverage, payment models, licensing, data collection, and quality reporting associated with better maternity care and outcomes.

Drawing from the best practices of state-level quality improvement initiatives, professional societies, and maternal mortality review committees, the Agency for Healthcare Research and Quality should convene a steering group composed of public sector and private sector leaders to review the evidence regarding maternal mortality and the recommendations of various groups (including the Aspen Health Strategy Group) to establish and publicize an action plan that engages all sectors to address the maternal mortality crisis.

2. Build and support community care models

Childbirth is the most frequent cause of hospitalization in the United States, with 3.7 million hospital stays per year representing more than 10% of all hospital admissions (Health Care Cost and Utilization Project et al., n.d.). The hospital bill accounts

for more than half of total spending on childbirth. While a small share of high-risk pregnancies and complex births must take place in the hospital, and those births require significant spending on clinical care, a successful strategy to reduce maternal mortality must shift resources out of the hospital and into the community.

Community-based models of care rely upon the expertise of midwives, doulas, and perinatal community health workers, who meet the medical and social needs of pregnant women in a respectful and culturally appropriate manner. Freestanding birth centers provide a cost-effective alternative to hospital deliveries for low-risk births, with a strong evidence base for better outcomes and higher rates of satisfaction.

The voices and needs of birthing people must form the cornerstone of the birthing experience, and systems of care should be built by and for birthing people and particularly Black and Indigenous women who currently experience the worst outcomes.

Support for community-based care models requires action in the areas of training, financing, and organization, as follows:

- The federal government should make a major financial investment in midwifery recruitment and training to increase the number of licensed and certified midwives to levels comparable to other high-income countries.

- Given the disproportionate burden of maternal mortality on Black and Indigenous women, training should emphasize expansion of the number of Black and Indigenous ob/gyns, perinatal nurses, midwives, perinatal community health workers, and doulas.

- States should review and, if necessary, revise their midwifery professional licensing and scope of practice laws to maximize midwives' ability to provide services commensurate with their training.

- States should develop standardized credentials for perinatal community-based providers.

- States should publicize their licensing and certification requirements for midwives to ensure that patients are aware of professionals' training and payers are able to include midwives in their provider networks.

- State insurance regulators should establish network adequacy standards for maternity coverage that include community-based models of care.

- Employers, insurers, and Medicaid programs should assure that group prenatal care and community-based models of care—including midwives, freestanding birth centers, doulas, and perinatal community health workers—are available to their enrollees.

- Hospital boards of directors should examine maternity care through a quality and equity lens in addition to a financial lens, enabling freestanding birth centers and midwifery-led care to become a part of their systems despite possible negative financial consequences associated with lower labor and delivery or neonatal intensive care unit revenues.

- Employers and insurers should examine and, if necessary, redesign the payment models they use for maternity care to assure access to services that meet women's needs while avoiding incentives for inappropriate or unnecessary hospital or physician specialist care.

- Employers should participate in and lead efforts to align public and private payment methods that support midwifery-led care models and community-based maternity care.

- As evidence accumulates regarding how new payment models work, those that are successful should be adopted consistently across public and private payers to solidify needed changes in maternity care delivery systems.

- States and local governments should collect and analyze data on maternity care capacity to identify care gaps and direct resources to closing those gaps.

- The federal government should support states in their development of regional systems of care that ensure access to appropriate services for high-risk pregnancies.

- States and local governments should develop regional maternity care systems that ensure that women with high-risk pregnancies are able to obtain needed care while avoiding overmedicalization of care for the vast majority of women who have low-risk pregnancies.

3. Redesign insurance around women's needs

Insurance coverage for pregnant and birthing women, whether private or public, is structured largely around the needs of the ob/gyns and hospitals that provide medical care. State insurance regulators, employers providing coverage to their employees, Medicaid agencies, and other relevant parties should examine the structure of insurance for maternity care and ensure that it aligns with the following elements:

• Congress should modify the Medicaid statute to make continuous coverage for one year after childbirth a mandatory eligibility category.

• All states should adopt the Affordable Care Act's Medicaid expansion to assure that low-income women have a source of insurance coverage prior to pregnancy and postpartum. Until such time, the federal government should develop a program that provides comparable continuous coverage.

• Insurance should be continuous for women of childbearing age. Medicaid eligibility should be extended to all low-income women who do not have coverage through their employer so that they are insured before they become pregnant and consistently after they give birth.

• State and federal insurance regulators, employers, and insurers should experiment with policies that reduce insurance losses and changes for pregnant women. Such policies could include extending the original source of coverage as women's employment or income changes, waiving new deductibles if there is a change in coverage, or prohibiting one payer from terminating coverage during pregnancy without proof of a new source of coverage.

• Coverage for mental health and substance use disorders must be an integral part of insurance for birthing people.

• Employers should provide their employees with paid maternity leave and examine their existing policies to increase uptake among lower-wage workers, and Congress should consider adopting a national paid maternity leave program.

Insurance must give birthing women access to the full continuum of care options without incentives that reinforce aspects of the current system that do not meet

women's needs. Insurance coverage should recognize midwifery-led care in payment and benefit policies as a standard of care with appropriate access to physician specialty care as needed.

We should continue to develop payment models that support health systems in addressing patients' nonmedical needs. In particular:

- Patient cost sharing for prenatal and postnatal care should be kept to an absolute minimum and should favor lower-cost community-based care options over more expensive institutional and physician-led care.

- Midwives should be paid equitably for their services and should be able to bill directly, rather than being required to bill under the services provided by a physician.

- Capitation and bundled payment models should continue to be developed that enable health systems to use resources to address social needs that can yield improved birth outcomes.

- Bundled payments should be structured to make access to community-based care available on par with access to hospital-based care.

- Health systems should continue and expand their efforts to document and address unmet social needs among their maternity care patients.

- Payment levels should be tied to quality as defined in part by patient-reported outcomes, measures of respectful care, and improvements in care coordination.

4. Tackle the racism that undermines women-centered maternity care

Policies that lead to poor birth outcomes must be changed, but lasting change depends on directly addressing the racism that led to those policies. While a broader antiracist agenda is beyond the scope of this report, important opportunities within the health care system must be embraced. They include:

- Quality and accrediting organizations should develop and promote the use of measures that incorporate aspects of care such as respect and responsiveness that reflect a system without bias.

- Health care organizations should achieve racial and ethnic diversity among their leadership and at all levels of staffing.

- Health care organizations should bring a diverse group of patients into decision-making roles such as boards and oversight committees.

- Health systems should embrace a variety of patient experience reporting mechanisms, ranging from formal methods such as CAHPS (Consumer Assessment of Healthcare Providers & Systems) and net promoter scores to informal methods such as Yelp reviews that allow patients to provide immediate feedback on their experiences.

- Health systems and employers should extend training beyond implicit bias to include the historical and current manifestations of structural racism, its effects, and how it can be dismantled.

- Public and private funders should increase their support for organizations led by women of color that are working and developing ideas to tackle the disproportionate burden of maternal mortality in their communities.

- All actors within the health system should review their policies and practices for elements of structural racism, dismantle those policies and practices, and undertake corrective action to reverse the harms those policies and practices have caused.

5. Invest in research, data, and analysis

For a crisis of this scale and scope, the data we have to understand and address it are shockingly limited. We must take the following steps to improve our understanding of and response to the crisis:

- The U.S. Centers for Disease Control and Prevention should establish clear and consistent standards for data reporting on maternal deaths in state vital statistics systems and should provide regular state-level and national reports on our progress toward national goals.

- The CDC should establish best practices for state-level maternal mortality review committees to increase our knowledge of the factors contributing to maternal deaths.

- All states should adopt best practices regarding collecting information through their vital statistics systems on maternal mortality. Variable methods should be used to conduct experiments regarding data quality, but ultimately, uniform methods must be employed to ensure the availability of comparable national data.

- All states should have robust maternal mortality review committees with broad data collection authority to improve our understanding of the root causes of every maternal death in the country. Summary results from these reviews should be made public on a regular schedule.

- Data on quality and outcomes should be collected and reported, at a minimum, at the level of the health system; hospital, group, or practice site; and payer.

- The federal government should collect comprehensive data on the availability of clinicians who provide maternity care and make these data publicly available. These data will enable better analysis of provider shortages, maternity care "deserts," and the relationship between provider supply and patient outcomes.

- All states should support perinatal quality collaboratives, which bring together hospital associations, departments of health, universities, payers, community-based organizations, and others, to analyze data and create action plans focused on priority activities designed to reduce the rate of maternal mortality.

- Congress should significantly expand research funding for the Agency for Healthcare Research and Quality (AHRQ) in the areas of maternal mortality and severe morbidity. Such funding should focus on evaluating opportunities associated with midwifery-led and community-based care models, with particular emphasis on improving outcomes for Black and Indigenous people, rural populations, and those covered by Medicaid, who currently experience the highest rates of maternal mortality.

- The federal government should develop a public/private research consortium that enables analysis using public data sources such as vital statistics combined with privately collected data such as insurance claims, internet search data, smartphone application use, and the like. Insurers, providers, patients, and electronic health record vendors should work together to develop and utilize the robust data that already exist and that can be used to identify opportunities for improvements in maternity care.

- The National Institutes of Health should devote funding to research the causes of maternal mortality and morbidity.

Moving Forward

There is growing understanding of and attention to the national crisis of maternal mortality (U.S. Department of Health and Human Services, 2020). Public awareness has been heightened by a steady stream of news articles on the subject. Academic and research organizations are increasing their focus on the topic. There is now a Black Maternal Health Coalition within the U.S. Congress, which has developed a package of legislative proposals referred to as the "Momnibus" (H.R. 6142) (Black Maternal Health Momnibus Act of 2020). Subsequent to our meeting, the Trump administration released an action plan to improve maternal health (U.S. Department of Health and Human Services, 2020).

As a new Biden administration is formed, it will face many competing priorities within health care and beyond. We believe addressing maternal mortality should be a high priority. In addition to the direct effects on women, their families, and their communities, failures related to maternal mortality are an indictment of the broader health care system. Or to take a more positive view, tackling the maternal mortality crisis will unleash changes that are positive for the overall health system.

The Aspen Health Strategy Group, with its multisector membership, has developed these ideas to catalyze improvements in policy and practice. We will share the report with members of the new administration and Congress, and we will promote its ideas in the private sector as well. We look forward to working with others committed to addressing the maternal mortality crisis.

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BACKGROUND PAPERS

**Understanding Maternal Mortality
in the United States**

Andreea Creanga, M.D., Ph.D.

**The U.S. Maternity Care System
and Maternal Mortality**

Eugene Declercq, Ph.D.

**Roots of Inequity
in Maternal Mortality**

Joia Crear-Perry, M.D., Inas Mahdi, M.P.H. and
Carmen Green, M.P.H.

Part 2

**Medicaid and Maternal Health:
A National Crisis at the Intersection
of Health Systems and Structural Racism**

Jennifer E. Moore, Ph.D., R.N., F.A.A.N. and
Karen Dale, M.S.N., R.N.

"Deaths of women from pregnancy and childbirth complications are tragedies with immeasurable consequences for families, communities, and society overall. We measure maternal mortality because we need to understand its root causes and prevent future maternal deaths from occurring."

– ANDREEA CREANGA, M.D., PH.D.

Understanding Maternal Mortality in the United States

Andreea Creanga, M.D., Ph.D.

Introduction

Dr. Shalon Irving held a dual PhD in sociology and gerontology from Purdue University and an MPH from the Johns Hopkins University at the time she joined the Centers for Disease Control and Prevention as an epidemic intelligence service officer. She dedicated her career to understanding and helping eliminate racial disparities in health. Her life ended abruptly at 36 years—three weeks after giving birth to a baby girl she named Soleil. Her mother, Wanda Irving, shared the circumstances of Shalon's death:

> "She just loved life. When Shalon found out that she was pregnant, she was just overjoyed. … She went to every single appointment, she did everything her obstetrician required of her. … Based on her history, her medical team thought it was best that she has a planned C-section. … Within four to five days after getting home she developed a lump on her side, she started having other symptoms as well, headaches, her legs started to swell, she started to gain weight. She had headaches and every time we would go in to see a doctor she was just dismissed with—*You just had a baby, give it time, it will get better.* And she said – *Mom, I don't feel right, there is something wrong*—and I was just so concerned, but I didn't know what to do.
>
> "During the last week of her life, Shalon went to the doctor three times for the same symptoms. On that last visit she presented with blood pressure of 174/120 [mmHg]—*Well, let me give you some blood pressure medicine and you go home and come back in a couple of days if it hasn't gotten better, but don't worry it should be fine, just give it a little more time.* After we left the doctor's office, we picked up her prescription and we came home. … All of a sudden, she started to have this gargled sound that came out of her mouth, and her arms shot up and she passed out. …
>
> "When I got to the hospital, the emergency doctor told me that she was in pretty bad shape. I found out a couple of days later that she was brain dead. … My cousin brought in a medical directive that I didn't even know Shalon had. …—*Mommy, I will fight hard, but if there is no hope, please let me go.* And the next night I happened to notice just one tea. It seemed like that it came out of one eye, and I knew then what I had to do. We have to take her off life support. …
>
> "I lost my vibrant, beautiful, intelligent best friend and daughter because she wasn't heard. I knew Shalon was a high-risk pregnancy because of her age, but I never for a moment thought that she was at risk of dying because she was a black woman."
>
> *Source*: Information from the Council on Patient Safety in Women's Health Care's *Voices of Impact video series (2000).*

Global Context

Maternal mortality is used around the world as a marker of population health, health inequalities, and health system functioning. The United Nations provides global-, regional-, and country-level estimates of maternal mortality every two to five years. The most recent such estimates were released in 2019 and provided levels and trends in maternal mortality for 2000–2017. Worldwide, about 810 women died from complications of pregnancy and childbirth each day in 2017, with 99% of these deaths occurring in less developed regions as defined by the United Nations Population Division (UNPD) (World Health Organization, 2019). The lifetime risk of maternal death (i.e., probability that a 15-year-old girl will eventually die from a maternal cause) was 1 in 160 in less developed regions and 1 in 5,200 in more developed regions (World Health Organization, 2019). During the 2000–2017 period, the overall maternal mortality ratio (MMR, the number of maternal deaths per 100,000 live births) dropped globally by 38.4%, considerably more in more developed countries (World Health Organization, 2019).

Twenty of the 44 countries in UNPD's more developed region had estimated MMRs greater than 10 deaths per 100,000 live births in 2000, and only nine countries did so in 2017 (Table 1) (World Health Organization, 2020). Of those 44 countries, only the United States had a sizable increase in maternal mortality during this period, increasing from 12 to 19 deaths per 100,000 live births (World Health Organization, 2019; World Health Organization, 2020). The four other countries in this UNPD region with the same MMR in 2017 (Latvia, Republic of Moldova, Romania, and Ukraine) had significantly reduced their maternal mortality rates from what they had been in 2000 (between 34 and 54) (World Health Organization, 2020).

Table 1. Maternal mortality ratio[1] estimates in more developed countries,[2] 2000–2017						
COUNTRY	2000	2005	2010	2015	2016	2017
Albania	23	22	21	15	16	15
Australia	7	5	5	6	6	6
Austria	6	6	5	5	5	5
Belarus	22	11	5	3	3	2
Belgium	8	7	6	5	5	5
Bosnia and Herzegovina	17	13	11	10	10	10
Bulgaria	19	15	12	10	10	10
Canada	9	11	11	11	10	10
Croatia	11	10	9	8	7	8
Czechia	7	5	4	4	4	3
Denmark	8	6	5	4	4	4
Estonia	29	18	11	10	11	9
Finland	6	5	4	3	3	3
France	10	9	9	8	8	8
Germany	7	6	6	5	5	7
Greece	3	3	3	3	3	3
Hungary	16	15	13	12	12	12
Iceland	6	5	5	4	4	4
Ireland	7	7	6	6	6	5
Italy	4	3	2	2	2	2
Japan	9	7	6	5	5	5
Latvia	34	30	26	23	26	19
Lithuania	17	14	10	9	8	8
Luxembourg	10	9	8	5	5	5
Malta	9	8	8	7	6	6
Montenegro	12	9	7	6	6	6
Netherlands	13	11	7	6	6	5
New Zealand	12	11	11	10	10	9
Norway	6	5	4	3	3	2
Poland	7	4	3	2	2	2
Portugal	10	9	9	9	9	8
Republic of Moldova	44	34	29	22	20	19
Republic of North Macedonia	13	10	8	8	8	7

Romania	54	35	27	21	21	19
Russian Federation	56	42	25	18	18	17
Serbia	13	12	12	13	12	12
Slovakia	8	7	6	6	6	5
Slovenia	12	10	8	7	7	7
Spain	5	5	4	4	4	4
Sweden	5	5	4	4	4	4
Switzerland	7	7	6	5	5	5
Ukraine	35	33	25	21	20	19
United Kingdom	10	11	10	8	7	7
United States of America	12	13	15	18	19	19

Source: Compiled by the author using the World Health Organization's Maternal Mortality Interactive Tool, available at http://mmr2017.srhr.org.

Notes: [1] Maternal mortality ratios (MMR, reported as number of maternal deaths per 100,000 live births) are estimated globally by United Nations agencies every two to five years, most recently in 2017; data for countries with MMRs > 10 deaths per 100,000 live births in 2017 are shown in gray cells; data for the United States are shown in blue cells. [2] United Nations Population Division designation, which includes all countries in Europe, Northern America, Australia/New Zealand, and Japan; this designation is intended for statistical purposes and avoids judgment about the stage reached by a particular country in the development process.

Each maternal death is one too many, yet the lowest attainable level of maternal mortality at the population level has not yet been determined. This is because not all maternal deaths are preventable, and preventability varies by the conditions leading to death and the presence of comorbid conditions during pregnancy (Davis, Smoots, & Goodman, 2019). In accordance with the Sustainable Development Goals, participating countries have set a target to reduce the global MMR to fewer than 70 per 100,000 births by 2030 (World Health Organization, 2019). There is a simultaneous call for countries to achieve equity in maternal mortality for vulnerable populations (World Health Organization, 2015). The U.S. Department of Health and Human Services' Healthy People 2030 project targets a reduction in maternal mortality to 15.7 maternal deaths per 100,000 live births (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2020).

Measuring Maternal Mortality

Why Do We Measure?

Deaths of women from pregnancy and childbirth complications are tragedies with immeasurable consequences for families, communities, and society overall. We measure maternal mortality because we need to understand its root causes and prevent future maternal deaths from occurring. Developing context-appropriate interventions starts with obtaining accurate maternal death counts and reliable information on the characteristics of women who died, as well as the causes, timing, and medical and social circumstances of their deaths.

What Do We Measure?

Standard definitions for deaths during pregnancy and in the postpartum period have been proposed by the World Health Organization (WHO) with the International Classification of Diseases (ICD, 10th revision [ICD-10, used since 1999]) and the U.S. Centers for Disease Control and Prevention (Centers for Disease Control and Prevention) in collaboration with the American College of Obstetricians and Gynecologists in 1986 (Table 2). Both the WHO/ICD-10 and the CDC use causal and temporal criteria to define such deaths in women of reproductive age; the WHO also differentiates between direct and indirect obstetric deaths based on the conditions—obstetric or other underlying—that lead to death.

Table 2. Maternal mortality definitions, common indicators, and data sources in the United States

Definitions	Common Indicators[4]	Data Sources
WHO/ICD[1]		**National Vital Statistics System[9]**—compiles data from all death certificates from all U.S. states and identifies maternal deaths using ICD O-chapter codes and/or information from pregnancy checkbox.10 Public access data with some restricted data elements; maternal mortality reporting in annual U.S. mortality reports stopped with 2007 data and reestablished with 2018 data. *Provides I–-I4 in line with ICD definitions*
Maternal death—"death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes."	**I1. Number of maternal deaths** in a population during a specified time period.	
• **Direct obstetric death**—"death resulting from obstetric complications of the pregnant state (pregnancy, labor and puerperium), and from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above."		**Pregnancy Mortality Surveillance System**—passive surveillance by CDC's Division of Reproductive Health requesting states to voluntarily send copies of death certificates for all women who died during pregnancy or within one year of pregnancy together with any linked live birth or fetal death certificates; conducting computerized searches of Lexis Nexis for media reports; and investigating in-depth abortion-related deaths, for which medical records and autopsy reports are also requested. Ongoing since 1987. Confidential data, with brief annual updates online, reports and/or peer-reviewed publications (1–2 per year). *Provides I1–I3 in line with CDC definitions*
Examples: deaths due to obstetric hemorrhage or hypertensive disorders of pregnancy.	**I2. Maternal mortality ratio[5]**—number of maternal deaths during a given time period per 100,000 births[6] during the same time period	
• **Indirect obstetric death**—"death resulting from previous existing disease or disease that developed during pregnancy and not due to direct obstetric causes but were aggravated by the physiologic effects of pregnancy."		
Examples: deaths due to aggravation by pregnancy of an existing cardiac or renal condition.		**State Maternal Mortality Review Committees**—multidisciplinary state-level committees with legal mandate to review either pregnancy-related or pregnancy-associated deaths that occur in the state upon identification by vital statistics agencies in the state through 1+ methods, always starting with death certificate data searches. About 70% of states have functional review committees. Confidential data, with state reports online (annually usually) and some with peer-reviewed publications (2 to 3 states per year). *Provides I1–I3 in line with CDC definitions (usually)*
Late maternal death—"death of a woman from direct or indirect obstetric causes, more than 42 days but less than one year after termination of pregnancy."	**I3. Maternal mortality rate[7]**—number of maternal deaths divided by person- years lived by women of reproductive age in a population.	
Pregnancy-related death[2]—"death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (obstetric and non-obstetric)."		
CDC3	**I4. Lifetime risk of maternal death[8]**—probability that a 15-year-old girl (in the year of the estimate) will eventually die from a maternal cause.	
Pregnancy-related death[2]—"death of a woman while pregnant or within one year of the end of a pregnancy, regardless of the outcome, duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."		**Hospital/Hospital System Maternal Mortality Reviews**—hospital-level reviews of maternal deaths conducted several times per year. Confidential data, with rare peer-reviewed publications (<1 per year). *Provides I1-I3 in line with chosen definitions*
Pregnancy-associated death—"death of a woman while pregnant or within one year of the end of a pregnancy, irrespective of the cause of death."		

Source: Compiled by the author.

Notes: [1]Definitions from World Health Organization's International Classification of Diseases, 10th revision. [2]Definition differs considerably from that provided by the Centers for Disease Control and Prevention. [3]Definitions from the Centers for Disease Control and Prevention developed in collaboration with the American College of Obstetricians and Gynecologists. [4]Common indicators exemplified using the term "maternal death," but it can be replaced with "late maternal death," "pregnancy-related death," or "pregnancy-associated deaths" as applicable with each data source. [5]Quantifies the risk of maternal death. [6]Live-births usually used in denominator given limited availability of stillbirth estimates needed to capture all births. [7]Captures both the risk of maternal death and the level of fertility in the population. [8]Indicator takes into account competing causes of mortality. [9]Considered the official source of national maternal mortality statistics and providing data for global maternal mortality estimation exercises.

The WHO/ICD-10 definition of a *maternal death* (i.e., "death of a woman while *pregnant or within 42 days of termination of pregnancy*, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes"; World Health Organization, 2020) has traditionally been used for international comparisons. Recognizing that increasingly more women die from complications of pregnancy and childbirth later than 42 days postpartum, UN agencies have—for the most recent global estimation exercise—started using and reporting *late maternal deaths* (i.e., "death of a woman from direct or indirect obstetric causes, *more than 42 days but less than one year after termination of pregnancy*"; World Health Organization, 2020).

The CDC definitions are more widely used in the United States for surveillance purposes, both at state and national levels. The CDC defines a *pregnancy-related death* as the "death of a woman while pregnant or within one year of the end of a pregnancy, regardless of the outcome, duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (Centers for Disease Control and Prevention, 2020b). A *pregnancy-associated death* is a "death of a woman while pregnant or within one year of the end of a pregnancy, irrespective of the cause of death." Note that deaths that occur later in the postpartum period can be difficult to classify as pregnancy-related versus pregnancy-associated.

The most common indicators used to describe the burden of maternal mortality are the absolute number of deaths; the mortality ratio, usually reported per 100,000 live births; and the mortality rate, expressed per 1,000 women of reproductive age (Table 2). Another useful indicator is the lifetime risk of dying from maternal causes.

How Do We Measure?

Accurate measurement of maternal mortality has been and continues to be challenging (Creanga, 2018). In the United States, maternal deaths are identified and counted at hospital, state (or territory), and national levels (Table 2). There is no federal mandate for hospitals or states to report maternal deaths to the CDC or to any other health agency or hospital accreditation organization in the country. By contrast, in the United Kingdom, the country with one of the best maternal mortality surveillance processes in the world, hospitals are required to report maternal deaths to a central health agency. Such reporting is followed by an in-depth investigation into each death through a well-established Confidential Enquiries process, which has been in place since 1952 (Knight et al., 2017). In the United States, hospitals are not required to even conduct reviews of maternal deaths, and only a few have de-

veloped and implemented standardized processes for regular reviews of maternal deaths and data-driven action. As a result, with rare exceptions in published data, the most clinically nuanced source of data on *what went wrong* is lost. Not all maternal deaths occur in hospitals or other health facilities, hence the need for functional and reliable vital statistics systems at the state level that subsequently feed into the National Vital Statistics System (NVSS).

States usually initiate their identification of maternal deaths with death certificates for all deaths in women of reproductive age. Maternal deaths are identified on death certificates using (1) keywords in cause-of-death text fields related to pregnancy/postpartum or conditions specific to pregnancy/postpartum (e.g., obstetric hemorrhage, preeclampsia, peripartum cardiomyopathy), and/or (2) pregnancy checkbox information that flags cases of women who died during pregnancy or at a certain time postpartum. Linkages between deaths in women of reproductive age and either birth or fetal death certificates are performed in a majority of states, and where available these linkages help validate the information on death certificates, especially the pregnancy checkbox marking (Creanga et al., 2017).

About two-thirds of U.S. states have functional, multidisciplinary maternal mortality review committees (MMRC) that meet regularly to review pregnancy-associated or only pregnancy-related deaths identified in vital statistics data (Creanga et al., 2017). Reviewers have access to other sources of information, such as medical records, autopsy reports, reports from the state's Prescription Drug Monitoring Program, and police or social service reports. For this reason, data from state-based MMRCs are considered the gold standard in the United States (Creanga, 2018; Creanga et al., 2017). Most MMRCs review all pregnancy-associated deaths, while larger states either select a portion of deaths for review or restrict their reviews to pregnancy-related deaths.

For such rich information on maternal deaths to be available at the national level, all U.S. states would need to have functional MMRCs in place, use a standardized method for maternal death identification and review, and enter data into a common data entry system. The CDC and, more recently, the Health Resources and Services Administration have made important investments in developing these state-based committees. The CDC has developed and proposed for use a standard data abstraction form and data entry system called Maternal Mortality Review Information Application (MMRIA; Centers for Disease Control and Prevention, 2020a). To date,

only 14 states have submitted one or more years of data to the CDC using this system (Davis, Smoots, & Goodman, 2019). State-based MMRCs are, by and large, coordinated by state departments of health. MMRC recommendations and data are released usually online, either annually or every few years by coordinating agencies. Only rarely are these data disseminated in the peer-reviewed literature.

Two sources of national maternal mortality data exist in the United States (Table 2). The CDC's National Center for Health Statistics (NCHS) is the steward of national vital statistics (i.e., NVSS), traditionally considered the official source of U.S. maternal mortality data. The NVSS compiles death certificate data from all states and territories and identifies maternal deaths by translating the information captured in the cause-of-death section and with the pregnancy checkbox into ICD codes. These data have significant limitations, as discussed below. NVSS data are accessible online through a data compiler and in national all-cause mortality reports. (Reporting of maternal mortality data for the 2008–2017 period was discontinued.)

The other source of data is the CDC's Pregnancy Mortality Surveillance System (PMSS), which was established in 1987 due to the realization that death certificates alone fail to identify a large proportion of maternal deaths. Every year, states are requested to voluntarily send copies of death certificates to the CDC in Atlanta for all women who died during pregnancy or within one year of pregnancy, together with linked live birth or fetal death certificates. The CDC also conducts computerized searches of Lexis Nexis for media reports of maternal deaths and in-depth investigations of all abortion-related deaths. Data are obtained through confidentiality agreements with the 52 reporting areas, and thus are not publicly accessible and only available through brief annual updates on the CDC website as well as a few reports or peer-reviewed publications (or both) every year. While also heavily dependent on death certificate data, the PMSS data quality appears to be superior to that of the NVSS because it has the cause-of-death text information from death certificates rather than just ICD codes alone, as well as linkages to birth or fetal death certificates for deaths in women who had a birth. Also, for the PMSS, the CDC has all information reviewed by clinically trained epidemiologists. In the 2008–2017 period, the PMSS was the only source of national maternal mortality data (Centers for Disease Control and Prevention, 2020b).

Data Limitations

Limitations with maternal mortality data stem from the methods employed to identify deaths or the data sources used to document these deaths (Creanga, Thoma, & MacDorman, 2020). To improve the identification of maternal deaths, a pregnancy question was added during the 2003 revision of the standard death certificate in the United States as a five-category checkbox (Hoyert, Uddin, & Miniño, 2020). Experience from states like Maryland offered support for this approach; after adding the checkbox on the state death certificate, 98% of 2001–2008 maternal deaths were identified based on death certificates alone compared to only 62% in the eight-year period before the state added the pregnancy checkbox (Horon & Cheng, 2011). It took more than 15 years for all U.S. states to adopt the new standard certificate, during which time the NCHS did not provide a national maternal mortality statistic. This embarrassing situation ended in January 2020 with the release of maternal mortality reports assessing the effects of the variable implementation of the checkbox and providing 2018 data using the new coding rules mentioned above (Hoyert & Miniño, 2020; Hoyert, Uddin, & Miniño, 2020).

Over the past decade, researchers raised questions about the accuracy of the checkbox information, particularly its contribution to overreporting of maternal deaths in the United States. False-positive checkbox errors were especially evident among women 40 years and older and for nonspecific causes of death (Baeva et al., 2018; MacDorman, Declercq, & Thoma, 2017; Catalano et al., 2020). Most concerning, however, are data in a 2020 report finding that about 55% of records with a marked pregnant or postpartum checkbox had no health-care encounter suggesting pregnancy (e.g., prenatal visit, birth, abortion), while, conversely, for about two-thirds of decedents identified as having a pregnancy-related health-care encounter, the checkbox did not reflect their pregnant or postpartum status (Hoyert & Miniño, 2020). New coding rules appear to improve the specificity of cause-of-death information for maternal deaths in NVSS data (Creanga, Thoma, & MacDorman, 2020), but whether the NVSS now provides accurate maternal mortality figures remains unknown.

The more data sources used for case identification and the more opportunities for data triangulation and information validation across sources (e.g., linkages between death certificates for women and birth or fetal death certificates, validation of pregnancy status at the time of death through medical records or autopsy report reviews), the higher the quality of maternal mortality data. Efforts to strengthen the NVSS system and validate the maternal mortality information it provides using additional data sources are greatly needed.

Levels and Trends in Maternal Mortality in the United States

Figure 1A shows the dramatic decline in mortality from over 800 deaths to about 15 deaths per 100,000 live births in the United States between 1900 and 2007 (National Vital Statistics System, 2020), and the 17.4 deaths per 100,000 live births reported by the NCHS for 2018 when reporting resumed (Hoyert & Miniño, 2020). The 2018 maternal mortality statistic represents 658 maternal deaths identified in the NVSS (Hoyert & Miniño, 2020). We observe the bump in maternal mortality attributable to the 1918 influenza pandemic, and the beginning of the important, monotonic decline in maternal mortality that coincides with the introduction of penicillin in 1928. A variety of factors have likely contributed to this dramatic drop-off—some were general factors such as improved standard of living, including better nutrition and sanitation; some were related to changes in the structure of medicine and medical education; and others were improvements in hospitals and hospital deliveries, implementation of aseptic techniques, medical advances, and availability of blood transfusions (Creanga et al., 2018).

Figure 1A. Trends in maternal mortality in the United States, 1990–2007

Source: Compiled by the author using data from the National Vital Statistics System, available at https://wonder.cdc.gov/ucd-icd10.html.

Note: Number of maternal deaths per 100,000 live births per year. Reporting of maternal mortality data was discontinued between 2008 and 2017.
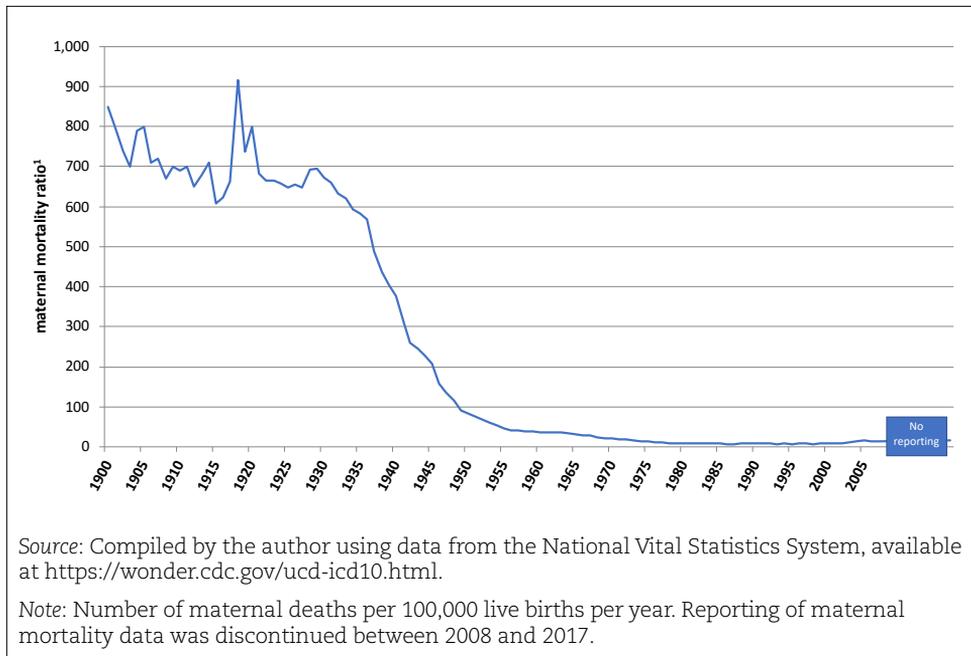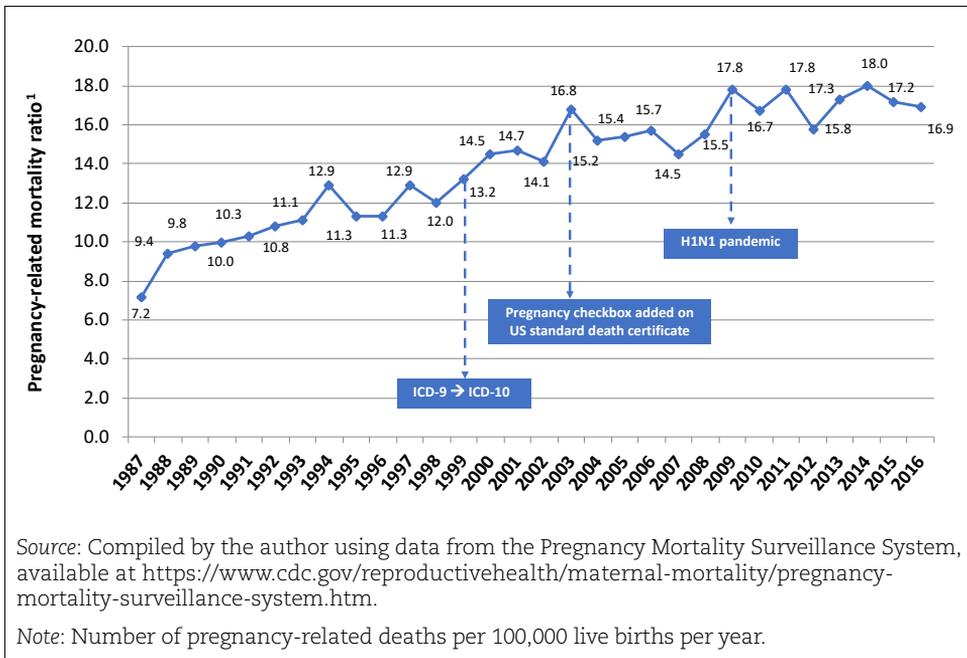
Figure 1B shows trends in pregnancy-related mortality ratios in the United States between 1987 and 2016, the most recent year of PMSS data available (Centers for Disease Control and Prevention, 2020b). Clearly depicted is that pregnancy-related mortality has not declined in the United States for 30 years, and it appears to have increased from 7.2 deaths per 100,000 live births in 1987 to 17.8 deaths per 100,000 live births during the 2009 H1N1 pandemic and 16.9 deaths per 100,000 live births in 2016 (Centers for Disease Control and Prevention, 2020b). The extent to which this increase is real or due to improvements in death ascertainment methods over time (e.g., a switch to a more comprehensive set of pregnancy codes with ICD-10 than ICD-9 in 1999, or the introduction of the pregnancy checkbox on death certificates in 2003) remains unknown. In one of its 2020 reports, the NCHS fully attributes the observed increase in MMR in the United States to the use of the checkbox on death certificates for maternal death ascertainment and not to a true increase in the risk of dying from pregnancy complications (Hoyert & Miniño, 2020).

Figure 1B. Trends in maternal mortality in the United States, 1987–2016

Source: Compiled by the author using data from the Pregnancy Mortality Surveillance System, available at https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm.

Note: Number of pregnancy-related deaths per 100,000 live births per year.
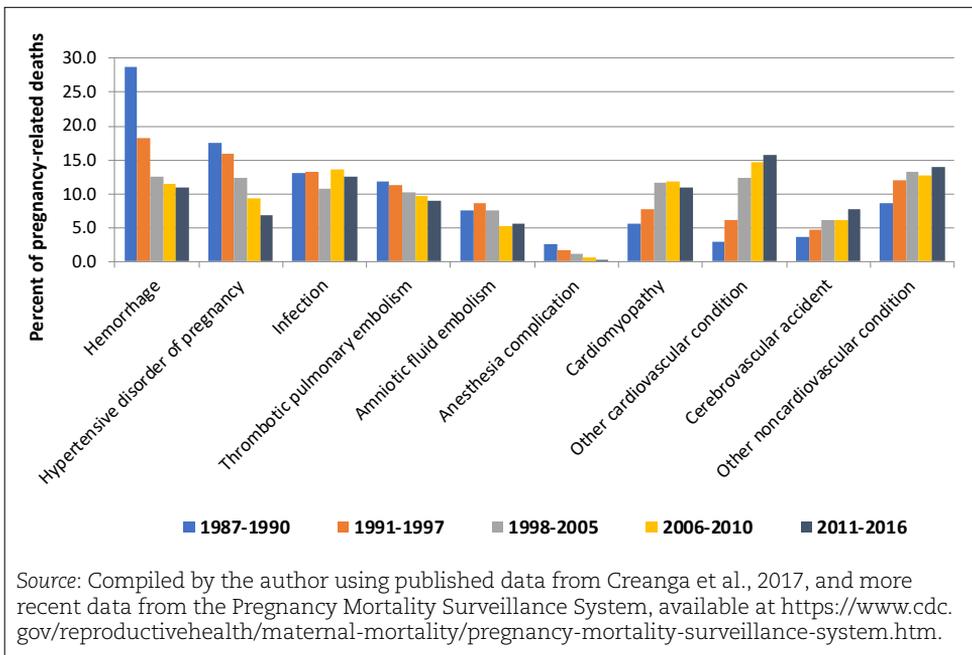
Pregnancy outcomes are known for about 90% of pregnancy-related deaths available in the PMSS every year (Creanga et al., 2017; Creanga et al., 2015). About a quarter of women every year die undelivered; 50% to 55% have a live birth; about 5% a stillbirth; and about 5% an ectopic pregnancy, induced or spontaneous abortion, or gestational trophoblastic disease. The timing of death in relation to the end of the pregnancy is also known from PMSS data for about 85% of women who died from pregnancy complications (Creanga et al., 2017; Creanga et al., 2015). Among these women, about 25% to 30% died before delivery, 15% to 17% on the day of delivery/pregnancy termination, 17% to 18% between one and six days postpartum, and 18% to 20% between seven and 41 days postpartum. Only 13% to 15% died on or after 42 days postpartum, and notably, this latter proportion ranged between 7% and 8% among Hispanic and 15% among non-Hispanic Black women (Creanga et al., 2017). Available 14-state MMRC data document a higher proportion of deaths after 42 days postpartum at 23.6% (Davis, Smoots, & Goodman, 2019). This may be an indication that the PMSS misses some of these deaths either because they are not reported by states or because it misclassified them as pregnancy-associated but not pregnancy-related.

Overall, approximately one in three deaths in the PMSS (Creanga et al., 2017) and in the 14-state MMRC data reported to CDC (Davis, Smoots, & Goodman, 2019) were pregnancy-related, while the others were considered pregnancy-associated, meaning they only have a temporal relationship with pregnancy. Trends in overall pregnancy-associated mortality are only available at the state level for states that review all pregnancy-associated deaths. Maryland, for example, has had a highly functional MMRC since 2001 and reviews all pregnancy-associated deaths in the state (Maryland Department of Health, 2020). During the 2000–2017 period, numbers of pregnancy-associated deaths varied between 29 in 2012 and 52 in 2017. Of the 320 pregnancy-associated deaths during this period, 119 deaths (37.2%) were judged to meet the CDC's pregnancy-related definition (Maryland Department of Health, 2020). Of all U.S. states, only California reports a 55% decline in maternal mortality (using the WHO definition) between 2006 and 2013—to 7.3 maternal deaths per 100,000 live births (California Maternal Quality Care Collaborative, 2020), a level that is comparable to those in Western European countries (e.g., 8.8 deaths per 100,000 births in the United Kingdom during the 2013–2015 period; Knight et al., 2017). California clinicians attribute their success to implementation of a statewide perinatal quality collaborative and the use of clinical toolkits developed for key contributors to mortality.

Causes of Maternal Deaths

The PMSS provides the most comprehensive and clinically nuanced information on causes of pregnancy-related deaths in the country at this time. Figure 2 documents the decline in the contribution of "traditional" causes of maternal mortality represented by obstetric hemorrhage, hypertensive disorders of pregnancy, infection, embolism and anesthesia complications, and the emergence of chronic conditions—especially cardiovascular conditions—as important contributors to mortality in pregnant and postpartum women. For the most recent period with available data (2011–2016), taken together, the above-noted "traditional" and "emerging" causes contributed about equally to pregnancy-related mortality (Centers for Disease Control and Prevention, 2020b). For comparison, cardiac disease is also the leading cause of maternal death in the United Kingdom, but at a lower rate than in the United States, while thromboembolism represents the United Kingdom's leading cause of direct maternal death (Knight et al., 2017).

Figure 2. Changes in the causes of pregnancy-related mortality in the United States, 1987–2016

Source: Compiled by the author using published data from Creanga et al., 2017, and more recent data from the Pregnancy Mortality Surveillance System, available at https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm.

Importantly, in the most recent PMSS peer-reviewed publication, cardiovascular conditions, including cardiomyopathy, and other medical conditions contributed more than 40% of pregnancy-related deaths among non-Hispanic White and Black women, but only about 25% of deaths among women of other races and about 30% of deaths among Hispanic women (Creanga et al., 2017). As documented by the 14-state MMRC report, cardiovascular conditions, hemorrhage, infection, embolism, preeclampsia/eclampsia, and mental health conditions accounted for nearly 75% of pregnancy-related deaths (Davis, Smoots, & Goodman, 2019). These state-level data confirm that the leading underlying causes of pregnancy-related deaths vary by race and ethnicity. Cardiovascular conditions were the leading underlying causes of pregnancy-related deaths among non-Hispanic Black women, while mental health conditions, including unintentional drug overdose, represented the main cause of death among non-Hispanic White women (Davis, Smoots, & Goodman, 2019). The MMRC report findings appear to be confounded by the difficulty in ascertaining pregnancy-related deaths, as unintentional drug overdoses and mental health disorders are indeed the main causes of pregnancy-associated but not pregnancy-related mortality in non-Hispanic White women in states such as Maryland (Maryland Department of Health, 2020), for example.

Risk Factors for Maternal Mortality

Several sociodemographic and medical characteristics have been examined as potential risk factors for maternal mortality. The risk of maternal death increases with age (Figure 3), leading clinicians to now consider all women 35 years or older as having high-risk pregnancies, even in the absence of other known risk factors. PMSS data show that the risks of dying from pregnancy complications in women who are 35 to 39 years old and 40 years old and above are two to three and five to six times, respectively, higher than the risk for younger women, with the risk or women 40 years and above increasing over time (Creanga et al., 2017; Creanga et al., 2015).

Figure 3. Pregnancy-related mortality by age and race-ethnicity, 2006–2010 versus 2011–2013

Source: Compiled by the author using published data from Creanga et al., 2017, and Creanga et al., 2015.
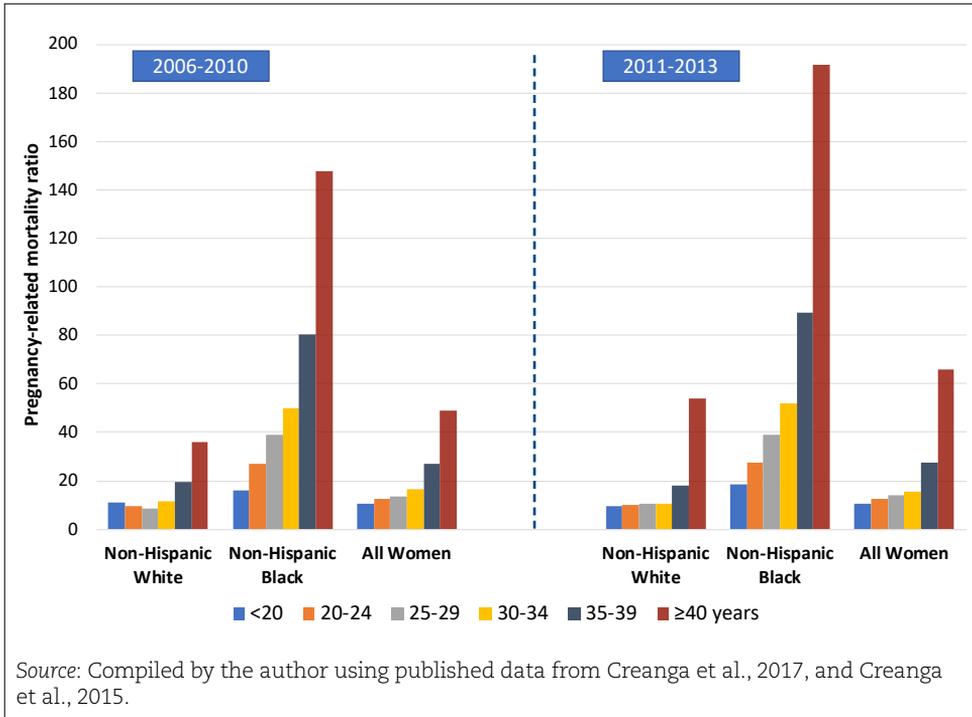
Striking and persistent racial disparities exist in pregnancy-related mortality in the United States. Compared to non-Hispanic White women, non-Hispanic Black women have a three to four times higher risk of dying from pregnancy and childbirth complications, and American Indian / Alaska Native women have a two to three times higher risk of dying from such complications (Centers for Disease Control and Prevention, 2020b). For non-Hispanic Black women, the interplay between age and race emerges most dramatically, and this cumulative risk appears to be increasing over time (Figure 3). An earlier article found that racial-, ethnic-, and nativity-minority women contributed 40.7% of all live births, but 61.8% of the pregnancy-related deaths during from 1993 to 2006 (Creanga et al., 2012). Except for foreign-born White women, all other race, ethnicity, and nativity groups were at higher risk of dying from pregnancy-related causes than US-born White women after adjusting for age differences (Creanga et al., 2012). Other significant risk factors for pregnancy-related mortality in the United States are low income; low education levels, especially for Hispanic women; and un-

married status for non-Hispanic Black women (Davis, Smoots, & Goodman, 2019; Creanga et al., 2017; MacDorman, Declercq, & Thoma, 2017).

Women's obstetric history may put them at higher risk of developing pregnancy complications and dying during a subsequent pregnancy and birth (Centers for Disease Control and Prevention, 2020b; Creanga, 2018; Creanga et al., 2017; Creanga et al., 2015). Notably, both nulliparous and high-parity women have a higher risk of developing life-threatening pregnancy complications, as do women with a previous cesarean delivery and those who relied on assisted reproductive technologies to conceive (Centers for Disease Control and Prevention, 2020b). Women who experience pregnancy complications in a previous pregnancy are at higher risk of developing the same or other potentially more serious complications in a subsequent pregnancy; a notable example is cardiovascular disease (Centers for Disease Control and Prevention, 2020b; Creanga, 2018; Creanga et al., 2017; Creanga et al., 2015; Sharma, Lindley, & Grodzinsky, 2020). For deaths following abortion procedures, which are very rare in the United States (0.7 deaths per 100,000 procedures from 1998 to 2010 [Zane et al., 2015] and fewer than six deaths every year over the past decade [Jatlaoui, Eckhaus, & Mandel, 2019]), case fatality rates were shown to increase with gestational age, from 0.3 to 6.7 deaths for procedures performed at eight weeks or less and at 18 weeks or greater, respectively (Zane et al., 2015).

The burden of preexisting and chronic conditions (e.g., hypertension, other cardiovascular disease, diabetes, obesity) that a woman has at the beginning of her pregnancy can be aggravated and have a negative impact throughout the pregnancy (Centers for Disease Control and Prevention, 2020b; Sharma, Lindley, & Grodzinsky, 2020). Pregnant women are disproportionally affected by all viral and bacterial infections. This was last documented at scale during the 2009 H1N1 influenza pandemic when 12% of pregnancy-related deaths were attributed to confirmed or possible influenza infection during the 2009–2010 pandemic season (Callaghan, Creanga, & Jamieson, 2015).

Recommendations regarding prenatal care seeking appear to be followed by only about two-thirds of pregnant women who die from pregnancy complications; about 10% of these women do not receive any prenatal care, while about 25% of them initiate care in the second or third pregnancy trimester (Creanga et al., 2017). In part, this may be due to women not having health insurance or not being aware of their eligibility for Medicaid coverage for pregnancy-related services and conditions that might complicate the pregnancy.

Preventability of Maternal Mortality

At the time of occurrence, not all maternal deaths are preventable. However, conditions that eventually cause maternal deaths can, by and large, be prevented with primary (e.g., health education), secondary (e.g., blood pressure screening), or tertiary (e.g., early management of health conditions) preventive measures. Assessment of the preventability of maternal deaths requires data on factors that, if modified, could have altered the outcome. These factors can be at the individual, provider, hospital, broader health system, or community level. A discussion of such factors usually takes place after the review of each maternal death by state MMRCs or as part of maternal death audits in birthing hospitals.

Several methods are available to assess preventability of adverse outcomes. For maternal mortality, the CDC's MMRIA system recommends that state MMRCs document preventability decisions in two ways: (1) determining if the death was preventable (yes/no), and/or (2) determining the chance that the outcome could have been altered (using a scale that indicates no chance, some chance, or good chance). Any maternal death with a "yes" response to the direct question or a response that there was "some" or a "good" chance to alter the outcome is to be considered "preventable," while the others are considered "not preventable." Applying this method to data from the 14 state MMRCs that shared data with the CDC, a preventability determination was possible for 78.0% of pregnancy-related deaths, of which 65.8% were determined to be preventable (Davis, Smoots, & Goodman, 2019). Interestingly, the share of deaths determined to be preventable did not significantly differ between racial-ethnic groups (Davis, Smoots, & Goodman, 2019). In an earlier 13-state MMRC report, the authors also found that preventability did not vary significantly by timing of pregnancy-related death (Petersen et al., 2019).

Strategies to address preventable factors have been proposed, and some of them have been implemented both before and during the COVID-19 pandemic. Tackling preventable patient-level factors may include improving patient education materials or providing health and patient support services in women's homes. For provider-level factors, prevention strategies may include provider training to reduce missed or delayed diagnoses, implementing a maternal early warning system, improving communication and handoff between obstetric and other types of providers, and expanding clinical office hours and the number of providers who accept Medicaid. Actions to address health facility factors include implementing obstetric emergency protocols and

simulation training, providing telehealth/telemedicine/telementoring for facilities without maternal-fetal medicine specialists on-site, and developing systems to foster communication between providers. Prioritizing pregnant and postpartum women for temporary housing programs and improving access to transportation may address community-level factors that contribute to maternal mortality in the United States.

Conclusion

Maternal mortality is a national emergency in the United States. The country needs accurate data to describe trends in and risk factors for maternal deaths to answer critical questions such as whether the documented rise in maternal mortality is due to improved methods of death ascertainment or to a true increase in women's risk of dying from complications of pregnancy and childbirth. The NCHS does not validate information collected with the error-prone pregnancy checkbox on death certificates, which affects both national sources of maternal mortality data (i.e., the NVSS and PMSS). Despite maternal death reviews being considered a core public health function, not all states have functional MMRCs able to use data to drive action to improve care for pregnant and postpartum women and prevent adverse outcomes for mothers and newborns. With wide stakeholder support at the state level, the MMRCs' coordinating agencies can ensure that valid data are being collected and reviewed by multidisciplinary review committees that adjust their membership periodically based on need and are able to make actionable recommendations (Figure 4).

Figure 4. Maternal mortality review cycle: Quality assurance and action
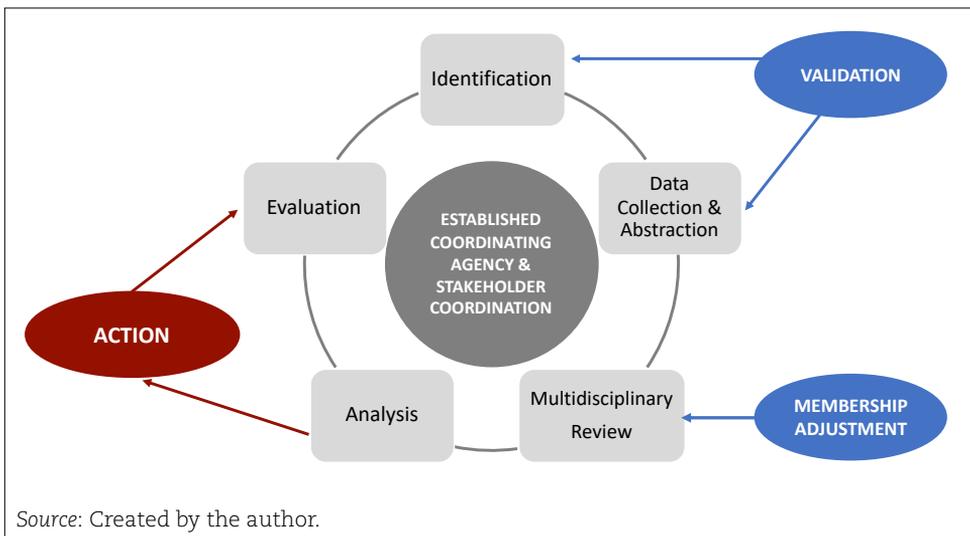
Source: Created by the author.

Striking racial disparities have persisted for over 30 years and need to be addressed in order to reduce maternal mortality. There is a need to expand horizons beyond a sole focus on mortality to look at the broader aspects related to social determinants of health, the quality of obstetric care offered to women, and risk factors for severe maternal morbidity. Involvement of patients and community groups from the most affected communities should help ensure that appropriate action is taken to support healthy pregnancies and safe childbirth for all women.

Finally, innovations in data utilization as well as delivery of maternity services are needed to understand and address root causes of maternal mortality and severe morbidity in the country. We need to develop a "social vaccine" to deliver the needed medical interventions to improve maternal outcomes for all U.S. women.

Andreea A. Creanga, M.D., Ph.D., is an associate professor at the Johns Hopkins Bloomberg School of Public Health (JHSPH) and holds a joint faculty appointment with the department of gynecology and obstetrics at the Johns Hopkins School of Medicine. She serves as Director of the Maryland Maternal Health Innovation Program and Associate Director for the International Center for Maternal and Newborn Health at JHSPH. Before joining the faculty at Johns Hopkins, Dr. Creanga spent six years at the U.S. Centers for Disease Control and Prevention first as an epidemic intelligence service officer and then as senior scientist leading the Pregnancy Mortality Surveillance System. Dr. Creanga's research is focused on perinatal quality and safety both domestically and internationally. She has active projects in Ethiopia, India and the United States, which are funded by the Agency for Health Research and Quality (AHRQ), Health Resources and Services Administration (HRSA), National Institutes of Health, and Bill & Melinda Gates Foundation..

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"Reducing maternal mortality is not just about better maternity care, but about improving women's health care across the life span. The key is reconceptualizing pregnancy as an opportunity to engage and keep a connection to those higher-risk women who otherwise remain outside the system."

– EUGENE DECLERCQ, PH.D.

The U.S. Maternity Care System and Maternal Mortality

Eugene Declercq, Ph.D.

> "The U.S. maternity system is fraught with uneven access and quality, stark inequities, and exorbitant costs, particularly in comparison with other peer countries."
>
> *Source*: National Academies of Sciences, Engineering, and Medicine (2020)

The Contemporary Challenge

Writing about maternal mortality often comes loaded with metaphors to describe the breadth of the problem such as "tip of the iceberg" and "canary in a coal mine," my personal favorite (Declercq & Shah, 2018). The rise in maternal mortality in the United States from the 1990s to the 2010s was not the result of any single factor, but rather a predictable result of wider failures in medicine, public health, and social services. In the past decade, great efforts to improve hospital care, one key component of the system, have been undertaken. Perhaps as a result, maternal deaths in the United States have plateaued since 2010, though at a rate far higher than comparably large industrialized countries. Decreasing maternal deaths will require continued efforts in improving hospital care, but also a commitment to increasing health and social services at the community level—a complex step for which policymakers have, until now, shown little appetite. Two stories illustrate the different dimensions of the challenges faced in maternal health.

The 36-year-old non-Hispanic Black woman had just given birth to her first baby, which was a little unusual since the average age for a first birth to Black women is 25. Her birth was special in another way because she would be viewed as higher

risk, since seven years earlier she'd experienced a pulmonary embolism (blockage of an artery in the lungs) that resulted in emergency hospitalization. While in labor, the fetal monitor readings detected a drop in her baby's heart rate that led to an emergency cesarean. The following day, she felt a shortness of breath that triggered in her fear of another embolism, in part because she had been taken off her anticoagulants as a result of the cesarean. Her concern was not misplaced, since a 10-year national study found pulmonary embolisms to be the fourth-leading cause of maternal deaths among Black mothers (Petersen et al., 2019b). Based on her prior experience, she went to the nurse's station and requested a CT scan and an IV blood thinner immediately. The nurse, thinking her pain medications had caused her to be confused, called in a doctor who ordered an ultrasound on her legs, which found nothing. Ultimately, at the patient's insistence, she was given the CT scan, blood clots were found in her lungs, and she was given the IV she had initially requested. She later stated, "I was like, listen to Dr. [me]" (Haskell, 2018). She wasn't alone in her sense that, as a Black woman, she wasn't being listened to.

While the details of this story may be unique, the pattern is not unusual. A national survey of new mothers found 21% of non-Hispanic Black mothers reporting that they were treated poorly during their hospital stay because of their race (Declercq et al., 2013). Stories like this have prompted calls for implicit bias training in all fields, including maternity care (Pereda & Montoya, 2018), but this case is different in one key respect since the woman involved was recently rated as the most famous female athlete in the world (ESPN, 2019)—Serena Williams—and staff still didn't listen.

The second story is a composite based on the author's review of multiple cases as a member of a state maternal mortality review committee (MMRC). At the time of her death, Marie (fictional name) was 29 years old and had given birth to three children. Her first two children had been taken away by Child Protection Services (CPS) because of her repeated drug use, an arrest record dating back to her teens, unstable housing, and reports of an abusive boyfriend. With the help of a supportive community program, including medication-assisted treatment (US Department of Health and Human Services, 2018) she stayed clean for this pregnancy, hoping, as she expressed regularly, that she could keep this baby. After she gave birth, CPS placed the

baby in foster care because, despite her sobriety, her housing circumstances were still uncertain and the support program she relied on was only available during pregnancy. Despondent, since she thought she had "done everything right this time," she moved in with a friend and attended Narcotics Anonymous meetings, but eventually resumed a relationship with the baby's father and started using again. In the first four months postpartum, she was taken to emergency rooms twice for overdoses and was later found dead from an overdose eighteen weeks after giving birth. A review of a decade of hospital, police, and public records found multiple encounters with the justice system; more than a dozen hospitalizations, mostly ER visits; and multiple referrals to social services. The pregnancy had provided many opportunities for a more supportive and effective health and social system to build on her sobriety, but once she had safely given birth, the system abandoned her.
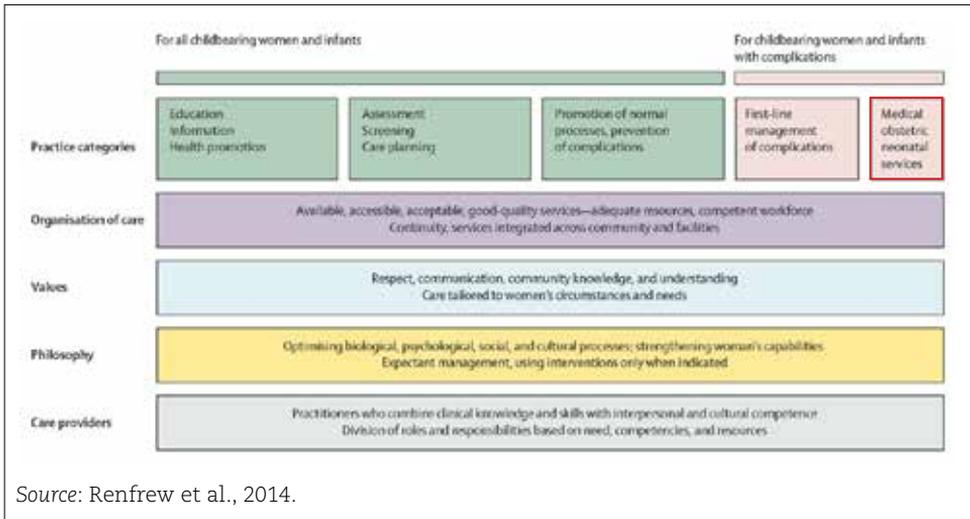
These two cases could not be more different, but they capture the systems challenges in addressing the crisis in maternal mortality in the United States—specifically the lack of integration of health and social systems and continued failures of those systems in dealing with patients of color.

What Would Quality Maternal Care Look Like?

A quality maternal and newborn care framework (Figure 1) exists. It includes the multiple components of quality care identified as a result of a major systematic review of the maternity care literature. The review discovered that disproportionate research and resources had been devoted solely to the box in red (Renfrew et al., 2014), despite the fact that quality care necessitates a broader approach to women's health that incorporates woman-centered, respectful care at the community level. Maternity care is not unique in that it characterizes a U.S. health-care system that has historically placed greater emphasis on curing rather than preventing disease and chronic illness (Rose, 1994). Pregnancy is unique, however, in that it typically involves hospitalization for a condition of health rather than illness. Over time, treating pregnancy as if it were an illness has become the norm (Starr, 1982). Figure 1 shows that quality care includes, but is hardly limited to, medical services.

Figure 1. Quality maternal and newborn care framework

	For all childbearing women and infants			For childbearing women and infants with complications	
Practice categories	Education Information Health promotion	Assessment Screening Care planning	Promotion of normal processes, prevention of complications	First-line management of complications	Medical obstetric neonatal services
Organisation of care	Available, accessible, acceptable, good-quality services—adequate resources, competent workforce Continuity, services integrated across community and facilities				
Values	Respect, communication, community knowledge, and understanding Care tailored to women's circumstances and needs				
Philosophy	Optimising biological, psychological, social, and cultural processes; strengthening women's capabilities Expectant management, using interventions only when indicated				
Care providers	Practitioners who combine clinical knowledge and skills with interpersonal and cultural competence Division of roles and responsibilities based on need, competencies, and resources				

Source: Renfrew et al., 2014.

A 2020 review by the National Academies of Sciences, Engineering and Medicine (NASEM) summarizes the current U.S. maternity care system (Figure 2). It emphasizes the contextual nature of maternity care, placing the health-care system within the wider net of the social determinants of health and structural inequalities in the United States. Most important, like the quality framework in Figure 1, this review reconceptualizes maternity care as part of a continuum that predates pregnancy and carries on after birth—in other words, women's health care. This perspective is critical in understanding the challenges of maternal mortality since, as described later in this essay, only one-third of maternal deaths occur during birth, while one-third occur during pregnancy and one-third between a week and a year after birth (Petersen et al., 2019).

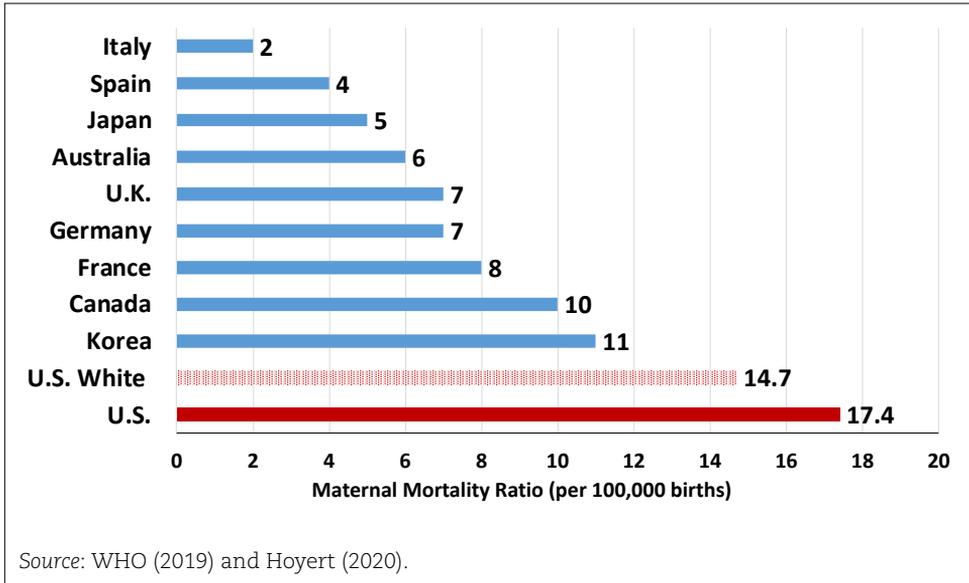**Figure 2. Interactive continuum of maternity care: A conceptual framework**
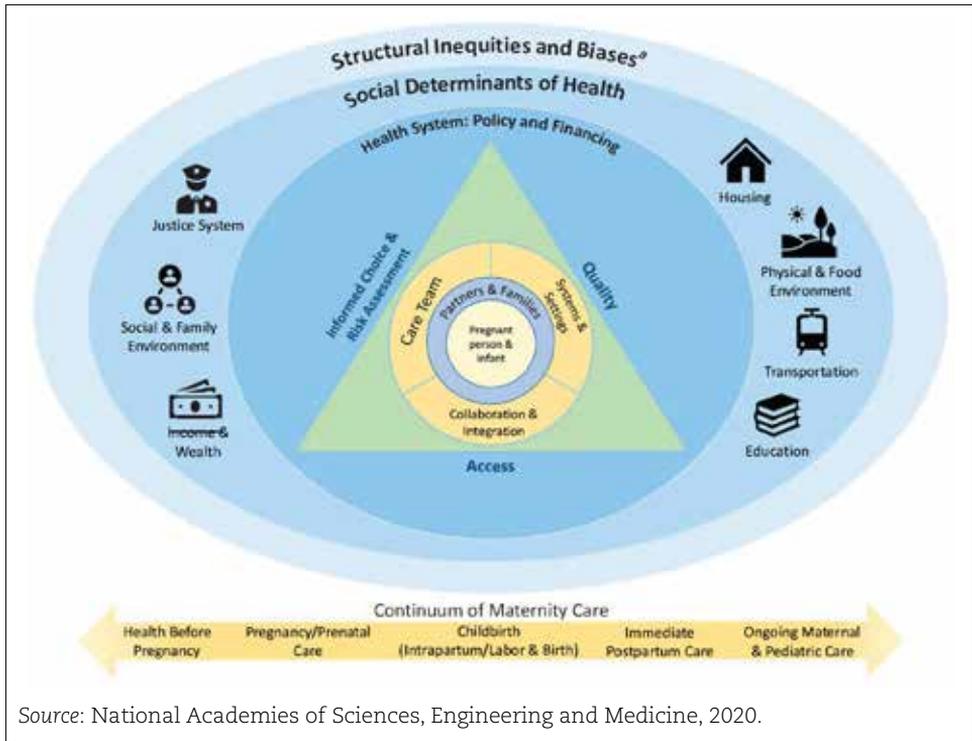
Source: National Academies of Sciences, Engineering and Medicine, 2020.

The U.S. Maternity Care System in a Comparative Context

To understand the limitations of the U.S. system, it helps to place our performance in the context of similar countries, as seen in Figure 3, which is limited to the 10 countries with at least 300,000 births (given the rarity of maternal mortality) and GDP per capita of $40,000 or more in 2017. The United States ranks 10th among the 10 comparison countries overall. Black-White disparities are a theme of another essay in this collection, but it is important to note that, while sizable and persistent disparities exist, even limiting comparisons to non-Hispanic White mothers, the United States still ranks 10th.

Table 1 provides context for the quotation that opens this essay: the United States spends far more and has decidedly worse outcomes than comparable countries. The problem extends well beyond maternal mortality with an array of poor infant out-

Figure 3. U.S. maternal mortality ratio (per 100,000 births) compared to wealthy countries with 300,000+ births, 2017-2018

Country	Maternal Mortality Ratio (per 100,000 births)
Italy	2
Spain	4
Japan	5
Australia	6
U.K.	7
Germany	7
France	8
Canada	10
Korea	11
U.S. White	14.7
U.S.	17.4

Source: WHO (2019) and Hoyert (2020).

comes. The U.S. system is distinct in terms of workforce and financing, as discussed below. The U.S. system is also unique in its lack of guaranteed, paid maternity leave and reliance on private insurance in general as well as in maternity care. Despite broad Medicaid eligibility for pregnant women, the United States still has 4% of births involving no insurance coverage, while other countries provide governmental insurance options for all pregnant women, with private insurance available to cover additional services (Davidson, 2008).

Table 1. Maternal and perinatal data on the United States and nine comparison countries

	Year	United States	Average OECD Comparison Countries	US Rank (of 10)
Context				
Live births (000)	2018	3,792	557	1st
Children per women (ages 15–49)	2018	1.73	1.48	2nd
Paid maternity leave entitlement (wks)[a]	2017	0	44	10th
Average maternity leave percent salary[a]	2017	0	55%	10th
Workforce, Setting, and Practice				
Obstetricians per 1,000 births	[b] 2015–2018	11.6	15.9	6th
Midwives per 1,000 births	2017	4.1	36.8	10th
Obstetricians & midwives per 1,000 births	2018	15.7	52.7	10th
% Births in hospitals [c]	2017	98.4	98%	na
% Births out of hospitals [c]	2017	1.5	~2%	na
% Cesarean births	2017–2019	31.7	30.3	4th (of 9)
Financing				
GDP per capita US$	2018	62,853	44,299	1st
PerCapita health expenditures (US$)	2018	10,586	4,412	1st
Median cost for a vaginal birth (US$)[d]	2017	11,167	4,807	1st (of 7)
Median cost for a cesarean birth (US$)[d]	2017	15,034	5,980	1st (of 7)
% Overall private Insurance coverage	[b] 2014–2018	62.7	49.9	4th (of 8)
% Private-funded maternity care	[e] 2018	49.6	na	na
% Public-funded maternity care	2018	42.3	na	na
% Self-pay maternity care	2018	4.2	na	na
Outcomes				
% Preterm births[f]	[b] 2014–2015	9.6	7.8	1st (of 6)
% Low birth weight	2017	8.3	7.0	1st (of 9)
% Severe maternal morbidity	[b] 2008–2013	1.6	[g] 0.7	1st (of 3)
Fetal death rate (per 1,000 births)[b]	[b] 2015–2017	6.1	3.9	1st (of 6)
Perinatal mortality (per 1,000 births) (includes fetal deaths)	2017	5.9	5.8	4th
Infant mortality (per 1,000 births)	2017	5.8	3.2	1st
Maternal mortality (per 100,000 births)	[b] 2016–2018	17.4	4.8	1st

Source: Unless noted, data is drawn from OECD Health Database, 2020 (Organization for Economic Co-operation and Development, 2020). Comparison countries: Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, United Kingdom.
a. OECD (2017), Family database, Table PF2.1.A; England Ministry of Finance (2017).
b. When multiple years are noted, data covers most recent year from respective country.
c. US data from birth certificates (CDC Wonder); comparison data estimated from country reports.
d. Cost data from Hargraves J and A Bloschichak International Federation of Health Plans (2019). Comparison countries: Australia, Netherlands, South Africa, Switzerland, United Arab Emirates, United Kingdom.
e. Payer figures from publicly available U.S. birth certificate data (CDC Wonder).
f. Data on preterm birth and fetal deaths from European Perinatal Health Report (Euro-Peristats Project, 2018).
g. Comparison with data from Australia and England (Lipkind et al., 2019).

Birth Settings

Hospitals

Birth in the United States, as in most of the industrialized world, primarily occurs in hospitals (Table 1). The transition from home to hospital birth, coinciding with the rise of obstetrics as a profession and the virtual elimination of midwifery, occurred during the first half of the 20th century (Starr, 1982). The development of new medications (e.g., twilight sleep) that, unlike chloroform and ether in use at the time, could only be administered in hospitals also encouraged the movement away from home birth (Caton, 1999; Wertz & Wertz, 1977). Finally, increasing access to hospitals themselves sealed the virtual elimination of home births in the United States. As the number of hospital beds grew nationally from 1.1 million to 1.7 million between 1935 and 1970, out-of-hospital births in the United States dropped from 63% to less than 1% by 1970. This figure remained steady until a resurgence in home births began in 2004.

Among the benefits of hospitalization for birth were centralization of services, especially for high-risk care, the provision of pain relief, and generally improved outcomes. However, concerns were raised that the routinization of practices in the hospital setting turned maternity care into an industrial model (Perkins, 2003) and, worse, could lead to unnecessary medical interventions, which themselves could cause harm (Illich, 1976). Three distinct factors have exacerbated hospital-based maternity care. First is the substantial rise in cesarean births, increasing by 60% between 1996 (20.5%) and 2009 (32.8%; Martin et al., 2019); the World Health Organization (WHO)–recommended rate is 10% to 15% (World Health Organization, 2015). The second factor was the closure of small maternity services, especially in rural areas (Hung et al., 2017; Lindrooth et al., 2018). This situation raised access concerns, with the March of Dimes terming the problem maternity deserts (March of Dimes, 2020), including more than 1,000 counties without an obstetrician, midwife, or maternity facility (Figure 4). Finally, the documented rise in maternal mortality and the wide disparities in mortality between Black and White mothers lead to questions about the quality of maternity care at hospitals, with powerful stories of inadequate care appearing regularly (Martin & Montagne, 2017a; Martin & Montagne, 2017b).

Figure 4. Maternity care deserts in the United States, 2019

Source: March of Dimes (2020).
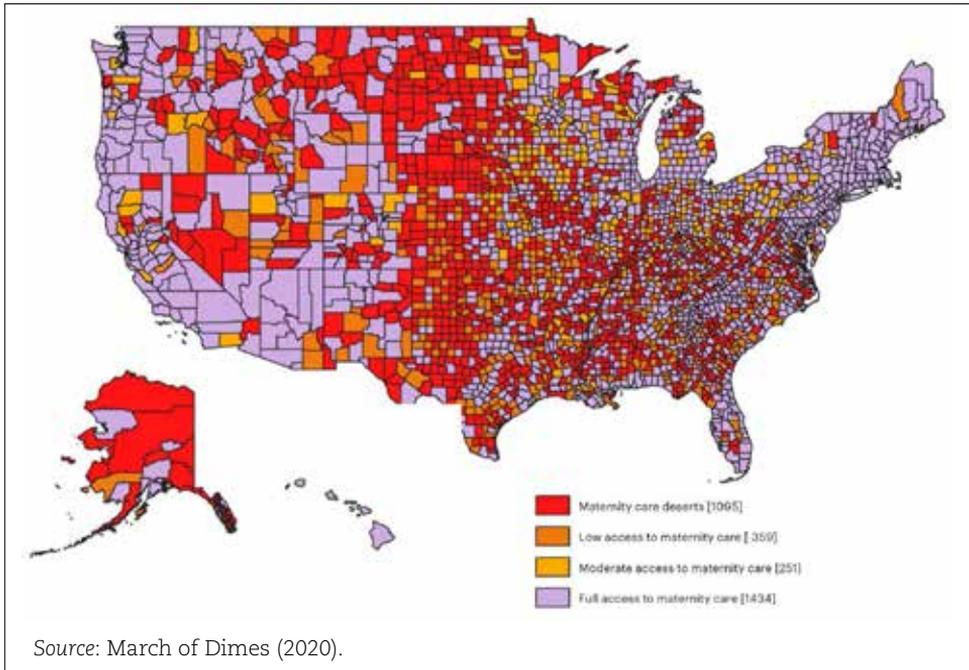
Perinatal Regionalization

One proposed solution for the access problem is perinatal regionalization, which involves a system of early identification of higher-risk cases and the assignment of those women to larger regional hospital centers. This model dates back more than half a century (Yu & Dunn, 2004), and recent studies have identified clear gaps in access to maternity care (Brantley et al., 2017; March of Dimes, 2020). These gaps have led to renewed calls for regionalization from the Centers for Disease Control and Prevention (CDC; Catalano et al., 2017) and the American College of Obstetricians and Gynecologists (ACOG; American College of Obstetricians and Gynecologists, 2019b) focusing on a system of risk selection and referral. However, much of the research and advocacy for regionalization has focused on infant rather than maternal health, and the evidence for its efficacy in the case of neonatal regionalization is mixed (Rashidian et

al., 2014). Models for universal risk selection remain a challenge; the most extensive such work was done in the Netherlands, where an elaborate and largely successful risk screening system was developed in conjunction with the nation's widespread use of home births (de Jonge et al., 2015). However, its applicability to the geographically larger, highly decentralized, and more medicalized U.S. system is limited.

Multiple additional challenges remain, from verification of appropriate hospital levels (Zahn et al., 2018) to implementation issues involving geographic differences in needs as well as transportation and communication barriers between hospitals (Kunz, Phibbs, & Profit, 2020). Regionalization in the U.S. context is further complicated by the general fragmentation of our health system, since it requires cooperation across state borders that may involve substantially different funding systems, particularly related to Medicaid coverage for pregnant women (Ranji, Gomez, & Salganicoff, 2019).

Home Births

Perhaps the clearest indication of maternal dissatisfaction with the predominant model of hospital-based birth in the United States is the recent rapid increase in out-of-hospital births to almost 60,000 annually (Figure 5). Notably, this activity occurred despite explicit warnings from the obstetrical community (American College of Obstetricians and Gynecologists, 2017). While U.S. home births were rare (< 1%) in the second half of the twentieth century, media attention to home births is understandable since they represent such a profound rejection of the existing medical paradigm (Kline, 2019). Couples choosing to give birth at home faced multiple barriers, including opposition from the obstetrical community (Declercq, 2012) and finding a qualified birth attendant because of restrictive state laws (Sullivan & Weitz, 1988). The low and slowly declining rate of home births in the United States changed after 2004, perhaps as a reaction to the rapidly increasing cesarean rate and renewed activism among home-birth midwives (Kline, 2019). From 2004 to 2018, out-of-hospital births increased by 80%, albeit from a very small base, and by 2018, 1.6% of U.S. births occurred outside of hospitals (Martin et al., 2019), including more than 38,000 at home. Most of the increase was among non-Hispanic White mothers (1.5% of their births in 2018 were at home; Centers for Disease Control and Prevention, 2020).

Studies of outcomes of home births have found that, in systems where home birth is integrated into the overall maternity care system, results are comparable to low-risk hospital births (National Academies of Sciences, Engineering, and Medicine, 2020), although comparisons are difficult to assess. Importantly, home births in the United

Figure 5. Out-of-hospital births in the United States, 1990–2019

Source: NCHS Annual Birth Reports.
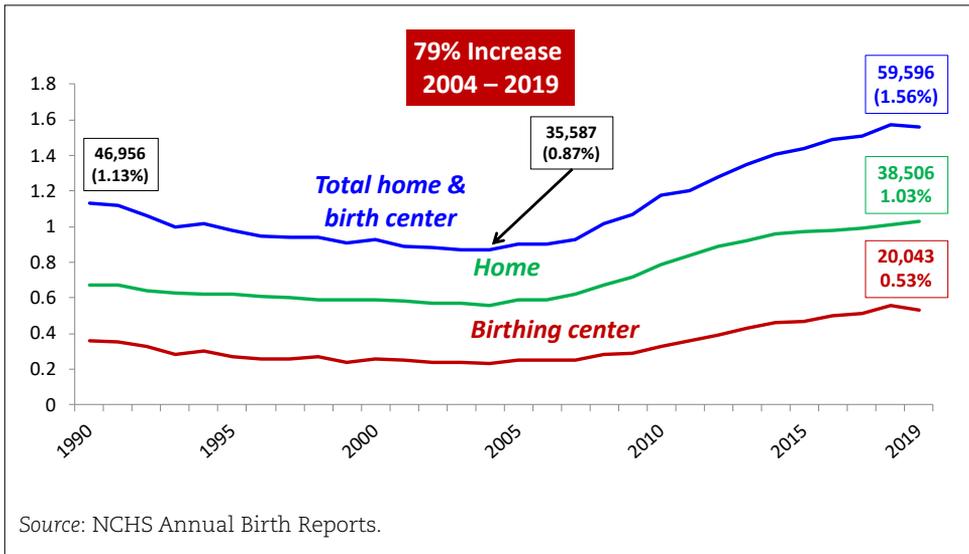
States have not generally been integrated into the overall maternity care system, so the future role of U.S. home births is unclear. The case of England may be instructive here. When home births became part of the maternity care system in the 1990s, home births rose from less than 1% in the late 1980s to 3.1% by 2008, but rates have since leveled off at 2.1% of all births (Office of National Statistics England and Wales, 2019).

Freestanding Birth Centers

The idea of a homelike facility separate from a hospital where women can give birth dates back to the 1940s with the establishment of a "maternity home" in Santa Fe, New Mexico (Cole & Avery, 2017). As home births appeared to become more popular in the 1970s, freestanding birth centers were seen as a "home away from home" where women could safely give birth yet remain in control of the process. Typically overseen by midwives and often located in a refitted home, birthing centers are regulated by state laws, which has limited their growth depending on the nature of the regulations. In the past they have also faced barriers to sustainability because of difficulties in establishing contracts with private payers and state Medicaid programs, although the Affordable Care Act (ACA) included mandated Medicaid reimbursement for licensed centers (Cole & Avery, 2017). A recent large-scale evaluation found birth outcomes in birthing centers to be better than for comparable women in hospital births, with lower rates of preterm birth, low birthweight, and cesarean

sections (17.5% vs. 29%), while having 21% lower delivery costs and 16% lower costs in an infant's first year (Hill et al., 2018).

The rise in births in freestanding birth centers coincided with the rise in home births after 2004, with the proportion of birth-center births more than doubling by 2018 to a total of more than 21,000. In a 2011 national survey of mothers who had just given birth in a hospital, when asked how open they would be in a future birth to using a freestanding birth center, 25% reported they definitely wanted that option, while another 39% would consider the option (Declercq et al., 2013). Though an NASEM report (National Academies of Sciences, Engineering. and Medicine, 2020) recommended an expanded role for freestanding birth centers, their growth will be largely determined by (a) state regulatory environments, (b) reimbursement arrangements with public and private insurers, and (c) sufficient midwifery workforce capacity.

What are the lessons for the hospital-based model of maternity care from those cases of out-of-hospital deliveries? More than three-fourths (77%) of home-birth mothers have given birth before (Centers for Disease Control and Prevention, 2020), almost all in a hospital. The question for the hospital system is what has driven so many women, despite warnings from obstetricians, to choose out-of-hospital birth. In surveys, these women cite a concern with the safety of hospital births, dissatisfaction with hospital care from previous negative hospital experiences, the desire for a low-intervention birth, more control over their care, and the desire for a less clinical environment (Boucher et al., 2009; Hazen, 2017). Also, recent research on mothers' reports of disrespect and abuse during childbirth found levels of inappropriate care several times higher in hospitals, compared to out-of-hospital births, suggesting the need for rethinking the nature of care and support in hospitals to help regain the trust of women giving birth in their facilities (Vedam et al., 2019).
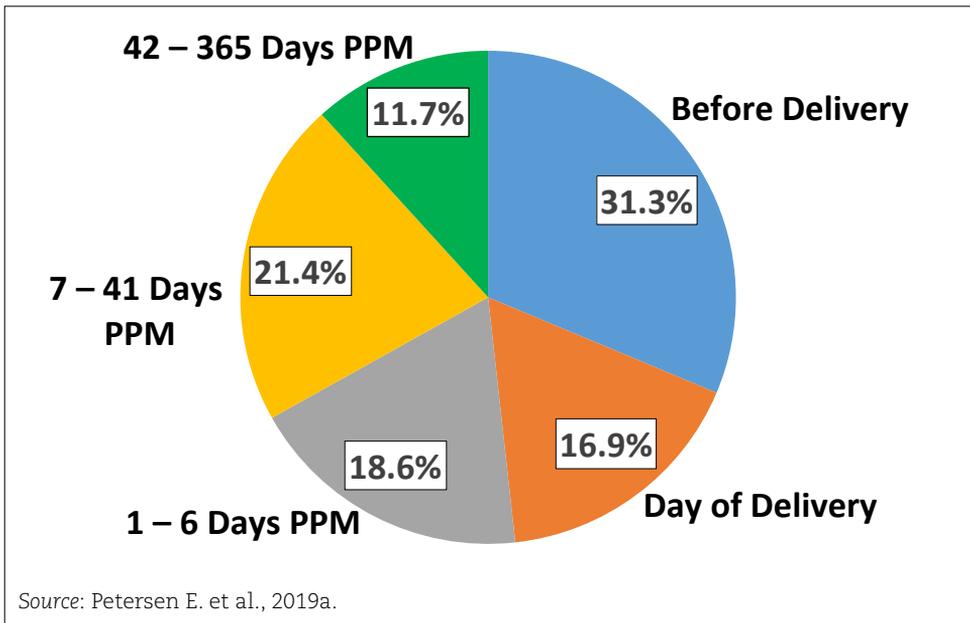
Prenatal and Postpartum Care

Community-Based Maternity Care

Aside from some hospital-based maternity clinics, prenatal and postpartum care in the United States primarily occurs in community settings. With two-thirds of maternal deaths occurring either during pregnancy or post-postpartum (Figure 6), there is

greater focus on women's health beyond the confines of the hospital. In 2018, 1.7% of all U.S. births involved no prenatal visits, while another 2.2% of births involved prenatal care beginning in the eighth or ninth month of pregnancy. These figures were notably higher for Hispanic and non-Hispanic Black mothers (3.1% and 3.5%, respectively; Centers for Disease Control and Prevention, 2020). Most prenatal care visits in the United States are with obstetricians. In one national study, 78% of women indicated that an obstetrician was the provider most involved in their prenatal care, with "accepted my insurance" as the major factor in choosing their prenatal provider. Family practice doctors (9%) or midwives (8%) were the next most common prenatal providers. The average length of a visit was 32 minutes. At the time of delivery, 21% of mothers indicated the birth attendant was someone they'd never met or briefly met (12%; Declercq et al., 2013). While ACOG has established guidelines for prenatal care, including testing and counseling, multiple studies have found the content of visits skewed toward testing over counseling (Dyer et al., 2018; Kogan et al., 1994).

Figure 6. The timing of pregnancy-related deaths

42 – 365 Days PPM

11.7%

Before Delivery

31.3%

7 – 41 Days PPM

21.4%

18.6%

16.9%

1 – 6 Days PPM

Day of Delivery

Source: Petersen E. et al., 2019a.

Group Prenatal Care

Interest is growing in group prenatal care, a model in which women attend prenatal visits in community clinics or doctors' offices with several other women with similar due dates. In one study, 22% of all U.S. women, including 30% of non-Hispanic Black women, indicated that at least one of their prenatal visits involved meeting with their provider in a group with other pregnant women (Declercq et al., 2013). These sessions are often facilitated by midwives and involve elements of childbirth education classes and health assessment (Novick et al., 2013). Early research on outcomes associated with the group model suggested positive results in reducing preterm birth and low birthweight and improving maternal satisfaction (Baldwin, 2006; Novick et al., 2013). Later systematic reviews focused on randomized trials were less enthusiastic (Carter et al., 2016; Catling et al., 2015) but noted no harm and generally positive responses from women participants, as well as potential cost savings (DeCesare & Jackson, 2015) prenatally and overall (Gareau et al., 2016).

Community Health Centers

Community health centers (CHCs) are community-based organizations that serve populations with limited access to health care; some CHCs receive support from the federal government and are designated as Federally Qualified Health Centers (FQHCs). CHCs commonly provide prenatal and postpartum care for Medicaid enrollees (Bryant et al., 2016). Importantly, as primary care providers, CHCs are involved with women facing social and medical risks through their lifespan, including reproductive (Janiak et al., 2018), behavioral (Pbert et al., 2004), and mental health (Johnson et al., 2018) needs.

Financing

This brief summary of the bewilderingly complex financing system for contemporary U.S. maternity care focuses on five factors: (1) the impact of the ACA on perinatal coverage, (2) the role of Medicaid funding, (3) the relationship between payments and services, (4) the role of "churn" in insurance coverage, and (5) rising out-of-pocket costs for maternity care. The current system, rather than mitigate the difficulties with fragmentation described above, largely exacerbates them. Thus, while reform of the financing system is a necessary first step in improving the maternity care system overall, the recent experience of the ACA and the associated Medicaid expansion is instructive of the challenges and limitations of doing so.

The Affordable Care Act

Under the ACA, maternity care is one of the 10 essential health benefits that insurers are required to provide. The intention was to standardize what had been a patchwork of different plans, coverage levels, and exclusions regarding pregnancy. A related provision gave states funding to first require and, following the Supreme Court decision in *National Federation of Independent Business vs. Sebelius* (2012), ultimately encourage states to expand Medicaid eligibility, with 39 states and the District of Columbia currently taking part in the expansion.

The impact of broadened maternity care coverage has been noteworthy. One study found that after the ACA there was an eight-percentage-point increase in insurance coverage for birth among women ages 15 to 44, split evenly between private health insurance and Medicaid. Among women with preterm births, a greater proportion now have private health insurance (Meltzer & Markus, 2020).

Also after the ACA, private insurance payment for births increased, while self-pay and Medicaid payment decreased, with a concomitant increase in early prenatal care and a decrease in preterm birth (Daw & Sommers, 2018). The expansion of Medicaid resulting from the ACA was also associated with a decline in infant mortality in those states with expanded eligibility for pregnant women (Wiggins, Karaye, & Horney, 2020). Whether these benefits will persist remains to be seen, but the expansion of maternity care coverage under ACA is undeniable.

Medicaid

Medicaid coverage is the subject of another essay in this series. As shown in Table 1, maternity care in the United States relies on a mix of public and private financing, which has gaps. For the 2017–2019 period, Medicaid's share of coverage for births was 42.2%, representing more than 1.6 million births a year. The proportion of births on Medicaid varies widely by state, with more than half of all births publicly funded in five states—led by Mississippi at 61.3% while in six states, less than 30% of births are Medicaid funded, including Utah at 23.2% (Figure 7). The differences in reliance on Medicaid or private insurance are not limited to interstate variation, with striking differences by race and ethnicity, as Figure 8 shows. The role of private insurance in

financing births ranges from 68% for non-Hispanic Asian mothers to 21% for non-Hispanic American Indian or Alaskan Native mothers.

Figure 7. Proportion of births paid for by Medicaid, 2019
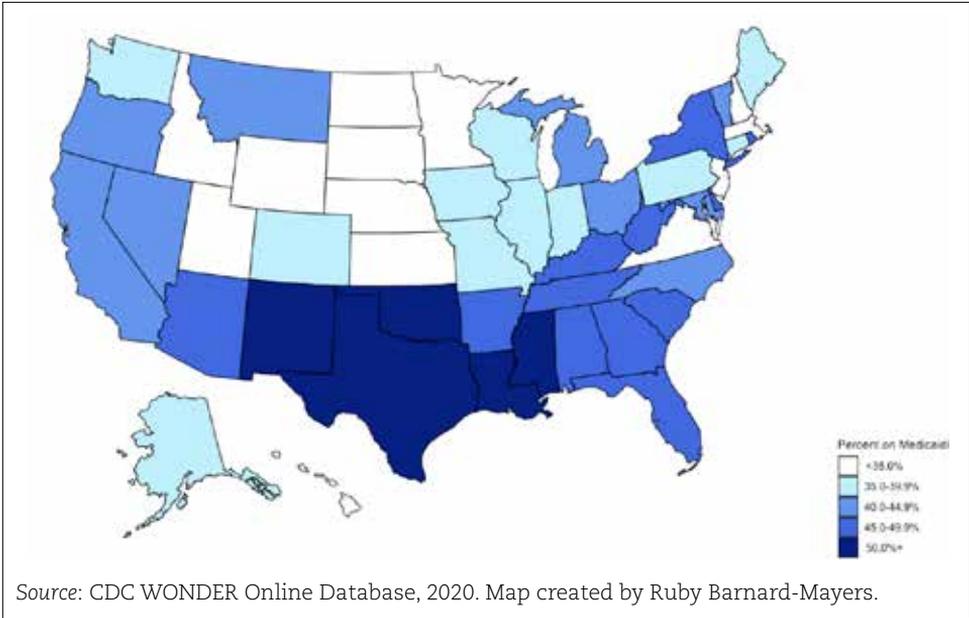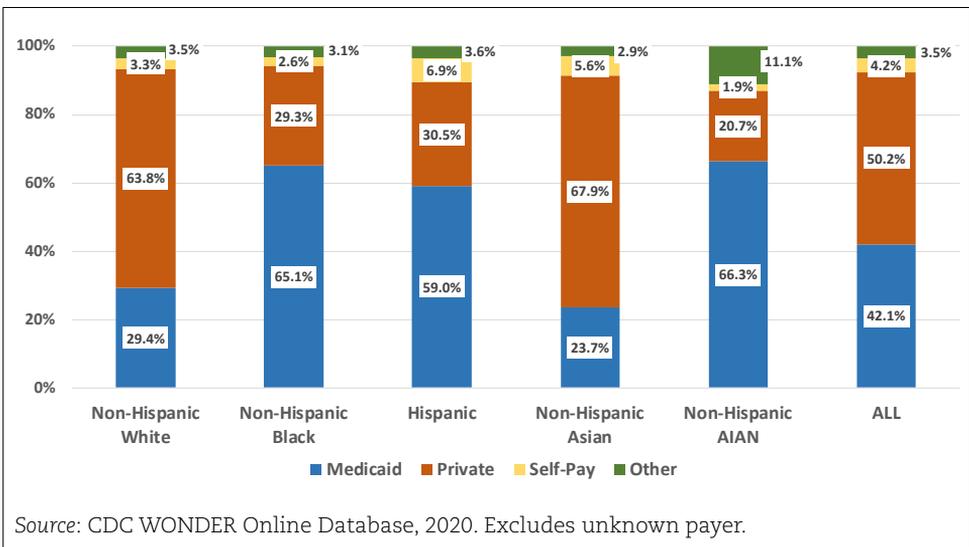

Source: CDC WONDER Online Database, 2020. Map created by Ruby Barnard-Mayers.

Figure 8. Payer for birth by race/ethnicity, United States, 2019

Source: CDC WONDER Online Database, 2020. Excludes unknown payer.

Payments and Services

The use of global payments for the entire period of maternity care for caregivers and hospitals was intended to simplify billing and the overall financing of care. In addition, providing the same payments for vaginal and cesarean births was seen as a disincentive for the overuse of cesareans. However, a study of 2010 national billing data found clinicians and facilities still received an average of $1,464 and $7,518 more, respectively, from commercial payers for cesarean as compared to vaginal births. Average total payments for maternal and newborn care were also twice as high for commercial payers as compared to Medicaid for both vaginal and cesarean births (Truven Health Analytics Marketscan® Study, 2013). In a more recent, post-ACA study of data from 35 states, the average reported cost for cesareans for women with employer-sponsored insurance was $17,004 compared to $12,235 for a vaginal birth in 2016–2017 (Johnson et al., 2020). The 2018 cesarean rate for lower-risk (first birth; full gestation; singleton, not breech) privately insured women in the United States (27.2%) was higher than that for women on Medicaid (24.9%). Cesarean births are also associated with higher rates of neonatal intensive care unit (NICU) admissions (9.1% vs. 4.7% for vaginal births) for these same lower-risk births (Centers for Disease Control and Prevention, 2020), with NICU stays serving as major revenue sources for hospitals.

The Truven 2013 study also presented data on the timing of spending across pregnancy and postpartum. More than 70% of the total costs were devoted to the birth hospitalization, while spending on prenatal care averaged 27% for women who ultimately had a vaginal birth and 21% for those with a cesarean. Notably, given the timing of maternal deaths presented in Figure 6, spending on postpartum care in the three months after birth averaged 2% of the total.

Churn

One feature of the fragmented perinatal insurance coverage in the United States is the disruption in coverage experienced by pregnant women who may switch, because of employment changes or state policies, from private to public to no insurance during the course of pregnancy and the postpartum period. A study conducted on data prior to the ACA (2005–2013) found 62% of women uninsured for at least one month in the nine months leading up to pregnancy (Daw et al., 2017), while a study using 2009 data from 29 states found that 30% of women experienced "unstable coverage," which they defined as "changes in health insurance coverage in the period between the month before pregnancy and the time of delivery" (D'Angelo et al., 2015). A post-ACA study using 2015–2017 data from 41 states found that a quarter of women (25%) reported an insurance change between preconception and delivery, while 29% reported a change

from delivery to postpartum. The rate of churn also varies widely by race/ethnicity with Hispanic Spanish-speaking (79.5%), Indigenous (50.1%), Hispanic English-speaking (49.3%), and non-Hispanic Black mothers (44.6%) all experiencing much higher rates of discontinuous insurance coverage than non-Hispanic White mothers (24.7%; Daw et al., 2020). The hope was that the ACA would make perinatal coverage stable and universal, but market forces and public policies related to Medicaid access and coverage (Ranji, Gomez, & Salganicoff, 2019) have limited its effect, and churn remains a central feature of maternity care financing.

Out-of-Pocket Payments

Notable growth has taken place in out-of-pocket payments related to perinatal care. A recent study of women with employer-based insurance reported a 49% increase ($3,069 to $4,569) in out-of-pocket payments between 2008 and 2015 (Moniz et al., 2020), while a study of commercially insured women based on 2016–2017 data found average out-of-pocket costs varying widely across states, with costs in South Carolina ($2,473) more than double those in Washington, DC ($1,077; W. Johnson et al., 2020).

The fragmentation and disparities in care seen in the U.S. system are mirrored in the U.S. financing of maternity care. Because there is wide state variation in Medicaid policies and regulation of commercial insurers, significant proportions of women—particularly women of color—move in, out, and between plans, and a variety of provider and hospital payment schedules exist that could potentially impact provider behavior and associated levels of interventions such as cesareans.

Personnel

Physicians

Historically, the primary attendant at birth has been a midwife, with levels of training and expertise evolving over the years (Litoff, 1978). Eventually, obstetrics developed as a specialty in medicine, with the American College of Obstetricians and Gynecologists established in 1951. Unlike in most countries (Table 1), obstetricians now dominate U.S. maternity care, attending a large majority (72%) of U.S. births (Declercq et al., 2013). More importantly, obstetricians shape the culture of maternity care

with an emphasis on early medical intervention in birth to prevent poor infant outcomes. Two relatively recent specialties have further encouraged medical intervention: maternal fetal medicine (D'Alton et al., 2019) and obstetrical anesthesiology, whose rise corresponds to the growth in the use of epidural anesthesia, now administered in 75% of U.S. births (Centers for Disease Control and Prevention, 2020). Family doctors still attend a small proportion of births in the United States, particularly in rural and underserved areas, although exact numbers are not known (Hung et al., 2017).

Midwives

In most industrialized countries, midwives play a far more prominent role in maternity care than in the United States. As Table 1 shows, the proportion of U.S. midwives is one-ninth that of comparable countries. The result is that the United States overall has only one-third as many maternity care providers per birth. Midwives in other countries often take the lead in providing community-based prenatal care and refer mothers as necessary to obstetricians when a medical need arises. They also attend a majority of the births, with a philosophy best captured in an article titled "Every Woman Needs a Midwife, and Some Women Need a Doctor Too" (Sandall, 2012). Research has found that midwifery models of care improve outcomes, are cost effective, are popular with women (Renfrew et al., 2014; Sandall et al., 2016), and have the potential to substantially reduce maternal mortality internationally (Van Lerberghe et al., 2014).

The United States has, broadly speaking, two general types of midwives: certified nurse midwives and certified professional midwives. Certified nurse midwives are advanced practice nurses with two years of additional training in midwifery. They work primarily as hospital employees, for physicians, or in community health centers. A certified professional midwife is typically an independent midwifery practitioner who has met the standards for certification set by the North American Registry of Midwives and works primarily in out-of-hospital settings. Their ability to practice varies based on state licensing and regulatory statutes, though 35 states now recognize them, and integrating midwifery into state maternity systems has been associated with better birth outcomes (Vedam et al., 2018).

Home Health and Doulas

Doulas (see Kennell et al., 1991) suffer from having a name many people don't understand and a role that has shifted profoundly in recent years. Originally seen as primarily providing support to women during labor, the role has recently added the responsibilities of a community health worker during pregnancy and postpartum. Extent of the use of doulas in the United States is unclear. A recent study of California mothers estimated 9% doula use, which was highest among non-Hispanic Black mothers (15%). The study also asked about doula support during the prenatal (6%) and postpartum (5%) periods. Notably, 57% of mothers indicated they would be open to using one in the future, including 66% of non-Hispanic Black mothers (Sakala et al., 2018).

There is evidence across multiple health outcomes of the value of continuous support in labor (Bohren et al., 2017). Research has also found cost savings associated with doulas, driven largely by decreases in preterm birth, cesarean rates, and other medical interventions (Greiner et al., 2019; Kozhimannil et al., 2016). The barriers to expanded use of doulas involve reaching agreement on standardized training, which prevents some insurers from establishing contracts; financially sustaining doula programs with limited funding (Mehra et al., 2019); and the challenge of recruiting, training, and retaining women from the community as doulas (Mottl-Santiago et al., 2020), even with greater need for perinatal home health workers (American College of Obstetricians and Gynecologists, 2019a).

Reducing Maternal Mortality

Systems Challenges

Maternity care epitomizes many of the challenges of the U.S. health-care system, from an overreliance on specialists to a failure to address racial, ethnic, and class discrimination at the intersection of social, policy, and health-care systems. There has been a concentration of resources in equipping and staffing hospitals to serve the highest-risk cases (Declercq & Norsigian, 2007), far more than building a community-based infrastructure focused on prevention that might reduce the frequency of those cases (Perkins, 2003). The evolution of the primary attendant at birth from midwives to family doctors to obstetricians (Leavitt, 1986) was typical of the movement of U.S. medicine into increased specialization (Shearer, 1991). Likewise,

maternity care systems have not been able to compensate for the legacy of racial inequity in the society. Cases such as Serena Williams's suggest that the maternity care system may simply reinforce disparities.

Maternity care also faces several challenges unique to the nature of pregnancy and childbirth. Perhaps most notable are the complexities that arise from serving two patients whose interests are usually, but not always aligned (Mattingly, 1992). A historical emphasis on infant health over maternal health is seen in public policies, such as expanded Medicaid eligibility for women when they become pregnant, but dropped 60 days postpartum. What clearer statement could be made about how women's health is valued relative to their babies' than in states where Medicaid eligibility income thresholds are five to 10 times greater during pregnancy than at other times in a woman's life (Ranji et al., 2019)? Gender bias also can influence policies and programs to provide maternity care. There was hope for sweeping change as obstetrics became a female profession (59% female in 2018, with more than 80% of ob/gyn fellows being female; Rayburn & Tracy, 2016), but evidence concerning different practice patterns by gender is less clear. Even as female obstetricians became the majority, the United States remains unique in its resistance to a midwifery model of care where more than 98% of its providers are female (Kantrowitz-Gordon, Adriane Ellis, & McFarlane, 2014).

Improving Hospital Care

On a positive note, substantial improvements in hospital-based maternity care have been under way for more than a decade, mostly related to quality improvement efforts. The California Maternity Care Quality Collaborative has built a range of tool kits on key challenges in maternity care (e.g., postpartum hemorrhage, preeclampsia), especially for high-risk patients, and these have been adopted at hospitals around the United States (Bingham et al., 2011). Similar efforts have been established through the National Partnership for Maternal Safety (Bernstein et al., 2017) and the Alliance for Innovation on Maternal Health (Mahoney, 2018). Finally, with strong support from the CDC, there has been a rapid growth in state perinatal quality collaboratives (PQCs), with 27 states now supporting these collaborations of state hospital associations, state departments of health, universities, nongovernmental organizations, and payers.

Improving Community-Based Care

Community-based care options for women in general, and for higher-risk women in particular, are limited in the United States. Women enter prenatal care less healthy and later than they might otherwise be expected to because of limited health education, limited insurance coverage, or limited local access to quality, respectful care. As noted, upward of 20% of women of color still begin their pregnancies without insurance, while a similar proportion reported no insurance postpartum (Daw et al., 2020). Given uneven coverage, it is perhaps not surprising that many women begin prenatal care late. An estimated 11% of women don't have a single postpartum visit (Danilack et al., 2019), which can be a result of coverage gaps as well as a woman's belief that only her infant's health matters, as evidenced by the far greater

likelihood of a woman missing a maternal rather than a pediatric visit (Sakala et al., 2018). Nonetheless, the result is the same: neglected preventive care exacerbating a problem that becomes emergent perhaps months after birth.

Our system for postpartum care is not conducive to continuity of care, relying upon a six-week postpartum visit with an obstetrician, followed presumably by a handoff to a primary care provider. Despite recent recommendations for more extensive postpartum visiting (American College of Obstetricians and Gynecologists, 2018), given the financing and logistical challenges described above, the potential for losing women through these sizable cracks is considerable. And while numerous efforts are now under way to close these gaps (McCloskey & Bernstein, 2020), the fissures remain. The first step—increased access and support during the community-based components of maternity care—is essential, but it's only the first step. Expansion of community-based care must be rigorously evaluated to ensure that the services provided meet the needs of mothers and their babies, thereby expanding what is currently a limited evidence base for what works.

The improvements seen in hospital maternity care have come about through notable efforts of an alliance of providers and hospitals (and considerable federal funding) to develop tool kits and bundles to improve clinical practice. Achieving the same level of improvement in community based care will take additional resources,

but more importantly, a rethinking of how maternity care is envisioned—not as a system based primarily in a hospital, but one that relies on providers who are an integral part of, or have strong links to, the communities they serve from which the women come. Evidence shows that community health workers, and community based doulas in particular, are a well-suited and cost-effective way to provide these services (Thomas et al., 2017; Wint et al., 2019).

Conclusion

Delays in getting women into maternity care associated with access to insurance in the prenatal period, combined with loss of those women from the system during the postpartum period, suggests the need for community-based care through a combination of private providers, group care, community health centers, and outreach programs targeting high-risk women. Programs based on more intensive contact and support either through home visiting (Olson et al., 2018) or telehealth and technological outreach (Athavale et al., 2016) for higher-risk postpartum women are being developed and tested, with a recent emphasis on telehealth as a result of the COVID-19 pandemic (Reforma et al., 2020). However, for a system that sees investment in extraordinarily expensive equipment as a simple cost of operations to suddenly invest in the human capital necessary to have midwives, doulas, and home health workers fully integrated into the care system will necessitate a culture shift at least as profound as that of a century ago, when birth was moved from the community to the hospital and midwifery was all but eliminated as a profession (Starr, 1982; Wertz & Wertz, 1977).

Reducing maternal mortality is not just about better maternity care, but about improving women's health care across the life span. The key is reconceptualizing pregnancy as an opportunity to engage and keep a connection to those higher-risk women who otherwise remain outside the system. That requires us to ask different questions about the nature of care (Kennedy et al., 2018), understanding that it takes more than brief visits focused on tests and maternity floors that look like intensive care units (Sudhof & Shah, 2019). It also means placing resources into the community to value women's health as a good in itself, regardless of their pregnancy status.

Eugene Declercq, Ph.D., is professor of community health sciences at the Boston University School of Public Health and professor on the faculty of obstetrics and gynecology at the Boston University School of Medicine. He has been part of the team that produced six reports since 2002 on women's experiences in childbirth, Listening to Mothers, and is the founder of the website www.birthbythenumbers.org. Dr. Declercq is also one of the founders of the Pregnancy to Early Life Longitudinal data system that has linked vital statistics, hospital, and administrative data on more than 1,500,000 births in Massachusetts since 1998. He is a current member of the Massachusetts Maternal Mortality Review Committee and is a recipient of the Martha May Eliot Award from the American Public Health Association for service to maternal and child health in the U.S.

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"We cannot separate maternal mortality and morbidity from the inequitable systems from which they arise."

— JOIA CREAR-PERRY, M.D., INAS MAHDI, M.P.H., and CARMEN GREEN, M.P.H.

Roots of Inequity in Maternal Mortality

Joia Crear-Perry, M.D.
Inas Mahdi, M.P.H.
Carmen Green, M.P.H.

Introduction

Despite medical and technological advances in care, the United States is in the midst of a maternity crisis. According to the Centers for Disease Control and Prevention (CDC), maternal mortality rates for American Indian / Alaskan Native and African American women are at least three times that of their White counterparts (Pregnancy Mortality Surveillance System, 2020; Centers for Disease Control and Prevention, 2020). Black women who survive birth are also twice as likely as White women to experience severe maternal morbidity (SMM), defined as unexpected birth and labor complications that lead to substantial long-term maternal health consequences (Creanga et al., 2014; Kilpatrick & Ecker, 2016). This paper focuses on high maternal mortality rates and poor maternal health outcomes of African American women.

Black women report experiencing mistreatment across their maternity care continuum at much higher rates than their peers. This mistreatment, often called *obstetric racism*, may manifest as neglect, unnecessary medical interventions, failure to obtain consent, or coercion (Perez D'Gregorio, 2010). Why are Black women experiencing higher rates of maternal mortality, severe morbidity, and mistreatment than their peers?

We cannot separate maternal mortality and morbidity from the inequitable systems from which they arise. To examine what leads to these inequitable outcomes in the U.S. health-care system, we must look at their root causes. Previous thinking about racial disparities in maternal health outcomes pointed to differences in behavior, genetics, failure of Black women's reproductive capabilities, and other erroneous

assumptions (Amini et al., 1994; Krieger, 2006; Davis, 2019). Burgeoning evidence demonstrates that these maternal disparities have little to do with race and all to do with Black women's experiences of racism (McLemore, 2019).
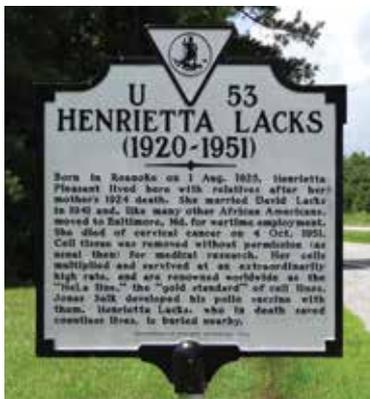
As the United States experiences a shift in racial consciousness and awareness of disparities, the maternal health community is moving, albeit slowly, toward reckoning with racism in clinical practice and society. Grappling with how we arrived here requires that we look to the United States' long racist and repressive history related to Black women's bodies.

Race, Racism, and Maternity

Geneticists have long documented that race is not a biological concept but rather a social construct that results from social interactions that often involve property, power, and oppression (Tishkoff & Kidd, 2004). Despite having no genetic basis, perceptions of race give rise to social meanings, racialized interactions, negative public perceptions and internalized stressors (Graves, 2015; Sloan, 2011; Krieger et al., 1993; Lee & Ahn, 2013).

Several factors define Black women's experience with maternal health in the United States: control of Black women's bodies for monetized value, medical racism, and devaluation of Black women's lives and experiences. Since the first enslaved African women were brought to the Americas, Black women's reproductive capacity has been solely defined by its value for White society. This legacy lingered after the abolition of slavery, with forced sterilization campaigns of poor Black women who were deemed not valuable, and continued medical mistreatment and experimentation (e.g., forced gynecological research participation, female partners of those in the Tuskegee experiment, Henrietta Lacks, and unconsented medical practices; Washington, 2006; Roberts, 1997. Unique to Black women's experience as minorities is the fact that Black women's reproductive capacity was utilized to generate centuries of unpaid workers to build the economy. Black women were also subjected to exploitation through scientific experimentation (Davis, 2019). The father of modern gynecology and founder of the first women's hospital, J. Marion Sims, derived many of his techniques and obstetric tools through cruel practice on eleven enslaved women (Washington, 2006). Sims is

one example of historic medical mistreatment undergirded by a guiding ideology that Black people's lives and bodies were simply "clinical material" for use by physicians and researchers (Washington, 2006).

Black midwives were some of the only medical professionals who sought to provide dignified care for Black people during slavery. These midwives brought African birthing traditions with them and cared for Black pregnant women and other enslaved people, and often attended births of White women as well (Bonaparte, 2007). After slavery, Black midwives continued as Black women's primary source of maternal health care. They enjoyed high community status because of their ability to provide community care, despite restrictions on access to medicines and facilities (Oparah & Bonaparte, 2015). With years of experience attending births, Black elder midwives often trained White physicians in attending births (Bonaparte, 2007). However, in the early 1900s, as medicine and birth became "professionalized," Black midwifery practices were targeted as unprofessional, and Black midwives were painted as "unqualified" (Reed & Roberts, 2000).

Black midwifery practices were almost completely annihilated by efforts of the U.S. federal government and White physicians under the Sheppard-Towner Act of 1921. While the act laid the foundations for publicly funded maternal and infant health initiatives and access to clinical services, it also funded scrutiny of midwives who cared for many rural, poor, Black women. White physicians and public health nurses guiding the implementation of trainings believed that high maternal mortality rates were due solely to poor practices by those they deemed uneducated—notably Black midwives. In conjunction with specific laws targeting midwives, public health professionals and physicians capitalized on racist imagery to associate Blackness with uncleanliness, ignorance, and superstitions (Goode, 2014). These efforts did not improve maternal health outcomes for Black women, but they were successful in driving the majority of Black midwives from practice, leaving a vacuum for those in rural areas or too poor to access hospital services.

Today, Black women report continued mistreatment and disrespect during healthcare interactions. Research suggests that Black women, when compared against White peers with comparable health insurance, receive lower quality of obstetric care (Gavin et al., 2004). The sentiment that Black women are often to blame for their own

deaths is tacitly supported in the literature, with references to women's weight and stress as factors contributing to death (Yale Global Health Justice Partnership, 2018).

Even when controlling for risk factors like obesity and hypertension, comparative data from other developed countries suggest that what differs in mortality is the treatment Black women receive from health-care providers (McLemore, 2019). In a recent study of severe maternal morbidity, Black women who experienced a several maternal event reported providers' perceived lack of attentiveness and implicit bias as concerns leading to disappointment in care received (Wang et al., 2020).

The persistence of health inequities begs the questions: How do structural and targeted racialized actions lay the foundation for inequities in Black maternal health care that we see today? How do Black women's status and positionality in our society lead to incessant poor outcomes?

To better understand positionality we must first realize that, although race is not a biological construct, racism or treatment based on the perception of a person's race can impact biological processes. That is to say, racism can act on women's health physically as well as through the quality of care received, as racism elicits a stress response within women's bodies. Racism itself constitutes a severe threat to a person's health and well-being through chronic stress, and it operates at the individual, interpersonal, and structural levels, systemically perpetuating health disparities (Dominguez, 2011; Chambers, et al., 2020). Black women report higher
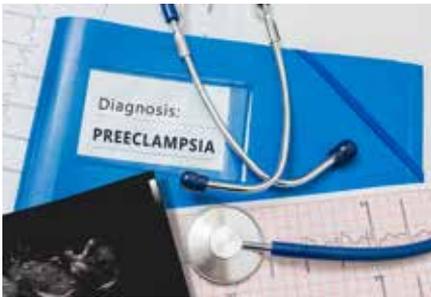
levels of stressors at multiple time points across pregnancy compared with women of all other racial and ethnic groups (Chambers et al., 2020). Exposure to these stressors (e.g., perceived stress, anti-Black racism, and racial discrimination) during pregnancy can negatively impact the immune system, which may lead to infection and is associated with increased risk for early onset of labor, preterm birth, or low birthweight (Braveman et al., 2017; Collins et al., 2000). The long-term psychological toll of racism puts Black women at higher risk for a range of medical conditions that threaten their lives and their infants' lives, including preeclampsia (pregnancy-related high blood pressure), eclampsia, postpartum depression, and protracted birth trauma (Alhusen et al., 2016; Ertel et al., 2012; Wang et al., 2020).

Perceptions of Black women as combative and uncooperative are gendered expressions of racism that can impact the provision of health care. Black women report having

their concerns about their health care dismissed, their experiences of perceived racism challenged, and feeling punished when attempting to confront power structures within health-care systems (Davis, 2019;Rushton,2019). Our current health-care system is structured such that, despite Black women experiencing decades of structural racism, discrimination, and mistreatment on the basis of race and gender, these experiences are routinely disregarded and Black women's experiences are rebuffed by powerful health-care structures (Davis, 2019).

As the United States grapples with racism, some health systems and organizations describe these phenomena that Black women are experiencing as either implicit bias or racism. *Implicit bias* describes the attitudes or stereotypes that affect our understanding, actions, and decisions in an unconscious manner. Understanding implicit bias is important because of its connection to structural inequality, policymaking, and inequitable treatment for birthing women of color. *Structural racism* is defined as the systematic approach used to advance the social, economic, and political status of Whites and limit access to goods, opportunities, and services to non-Whites. Broadly, structural racism applies to the conditions in which individuals are born, live, work, and experience resources, including health care. Structural racism in health-care and social service delivery has directly impacted the health status of Black people for generations (Taylor et al., 2019). Reducing maternal health inequities requires an understanding of how both structural racism and implicit bias underpin quality of care.

While both bias and racism are important for health systems to consider, structural racism must be prioritized as it is the legacy of racialized mistreatment that has dogged Black women since enslavement.

Conceptualizing an America without Maternal Inequities: A Reproductive Justice Framework

The U.S. health-care infrastructure is deeply invested in existing frameworks that hinder equitable health outcomes, particularly for Black birthing people. Looking deeply at the design of these systems and the needs of those with the poorest outcomes provides an opportunity to center frameworks that uplift Black women-led organizations, Black women scholars, and Black health-care providers and birth workers.

In 1994, a group of Black women activists known as the Women of African Descent for Reproductive Justice organized around human rights and reproductive principles, coining the term and framework "Reproductive Justice" (INCITE! Women of Color Against Violence, 2016). *Reproductive Justice (RJ)* is defined as the human right to maintain personal bodily autonomy, to have or not have children, and to parent the children we have in safe and sustainable communities. Reproductive Justice's founders sought to utilize a broad definition, highlighting the sociopolitical and economic conditions that dictate women's reproductive health outcomes. Utilizing Reproductive Justice as a framework for health equity assures that root causes contributing to health inequities are more thoroughly examined. The Reproductive Justice framework shifts from blaming women for having poor health outcomes to system-level accountability for programs and policies that directly impact quality of care and accessibility of health-care services necessary for individuals to achieve positive health outcomes. It forces acknowledgment that social determinants of health are dictated by upstream factors and are held firmly in place by societal and structural belief systems, racism, policies, practices, and leadership and organizational governance.

Operationalizing Reproductive Justice requires that we analyze systems of power that hold in place systemic oppression, incorporate multiple intersecting oppressions and understand how they impact marginalized women, focus on the most marginalized in our society, and unify across our intersectionality to assure human rights for all. Under this framework, maternal health advocates can focus on developing system-level accountability for operationalizing Reproductive Justice principles across the reproductive life course. Black women who have envisioned brighter futures for health outcomes and have been most marginalized by reproductive oppression should lead the charge for this new framework.

Rooted in Reproductive Justice is *birth equity*, a term coined by the National Birth Equity Collaborative, describing the assurance of the conditions of optimal births and well-being for all people combined with a willingness of systems to address racial and social inequities. At the root of Reproductive Justice and birth equity is the belief that all people are valued, they have fundamental human rights, and they should be

supported by governments and health systems to achieve the best possible health outcomes across the reproductive life span. Applying these basic frameworks not only ensures positive outcomes for Black women and other marginalized groups, but can also improve health outcomes for all birthing women.

Toward Birth Equity

We propose a set of solutions based on our work in the reproductive and maternal health space.

Reassess Frameworks and Principles

Birth equity requires that organizations be actively antiracist, meaning they are committed to undoing harms inflicted by embedded, historical structures and practices built into their organizations. At the time of this writing, antiracism organizational stances and related trainings are rapidly coming into place, spurred on by the police killings of George Floyd and Breonna Taylor and subsequent racial justice protests across the United States. Despite a countrywide upswell in attention to racial injustice, the Trump administration countered this with a ban on all trainings designed to elucidate concepts of racial equity within the federal government, describing such trainings as built on "the false belief that America is fundamentally racist and sexist" and "anti-American" (White House, 2020). This dichotomy illustrates at the highest level a climate of resistance to confront the foundations of inequities in our society.

As progressive organizations begin to critically analyze policies and harms, we see systems-level redesign also occurring. The first step in undoing harm is committing to continued critical analysis of an organization's methods, funding, programming, and internal- and external-facing policies. Adopting antiracism as a theme without critical assessment of an organization's actions is merely a slogan without the necessary support to shift organizational culture and policies. Black women–centered organizations must lead the charge, working alongside those within the health-care system. A commitment to antiracism requires a complete overturning of our maternal health-care system. New approaches must be rooted in both the recognition of the legacy and continued impact of racism on Black maternal health and make room for Black women–led solutions.

In 2018, the Black Mamas Matter Alliance developed a core set of principles describing Holistic Maternity Care for Black Mamas (Black Mamas Matter Alliance, 2018). The alliance, a collection of reproductive health and justice organizations, midwives, birth paraprofessionals, ob/gyn, researchers, and policy advocates, centers human rights, Reproductive Justice and the lived experiences of Black women on reducing maternal morbidity and mortality. The principles of Holistic Maternity Care for Black Mamas address community, culturally competent care, and racial and birth equity for Black mamas and Black communities. Drawing on those principles, the recommendations for those who provide care for Black women are as follows:

Listen to Black women.
Recognize the historical experiences and expertise of Black women and families.
Provide care through a Reproductive Justice framework.
Disentangle care practices from the racist beliefs in modern medicine.
Replace White supremacy and patriarchy with a new care model.
Empower all patients with health literacy and autonomy.
Empower and invest in paraprofessionals.
Recognize that access does not equal quality care.

These principles acknowledge that every birthing person has the right to dignified, respectful care throughout pregnancy and childbirth. Closely tied to reproductive and birth justice are additional frameworks that advocate for the proposition that every birthing woman has the right to safe, respectful, and quality care with the freedom and support to make decisions about pregnancy, childbirth, and postpartum with dignity. The New York City Health Department has spearheaded the development and rollout of standards for respectful maternity care (RMC; New York City Health Department, 2018). Implementing these standards will contribute to improving the quality of care provided to women who have been marginalized. New York's Respectful Maternity Care core standards for birthing people are education, informed consent, decision-making, support, and nondiscrimination.

The need is growing for a new theoretical model informed by actual patients to assess birth equity and respectful care in clinical settings in order to support intentional patient engagement

in systems, inform advocacy, and develop educational tools to address birth equity in maternity care. Currently, there are no patient measures collected or reported that reflect the experiences of those with the worst maternal health outcomes: Black birthing women. Black women–centered patient-reported experience measures that quantify experiences of disrespect and racial microaggressions within care are also under development (Green & Muhammad, 2020; Scott & Davis, 2020). Expanding on respectful maternity care are standards and the development of patient-reported experience measures, the National Birth Equity Collaborative has also created a Cycle to Respectful Maternity Care for providers informed specifically by Black birthing women and community-based organizations serving these women (National Birth Equity Collaborative, 2019).

Quality Improvement in Practice

As providers, policymakers, researchers, and funders develop more awareness of the impact of equity on poor maternal health outcomes, the field of maternal health is also experiencing a gradual shift in consciousness. Key to this move in hospital settings is the American College of Obstetricians and Gynecologists' Alliance for Innovation on Maternal Health (AIM). Utilizing a quality improvement framework, AIM seeks to improve quality of care through implementation of evidence-based patient safety bundles. In conjunction with an alliance of maternal and perinatal health partners, AIM led the development of a patient safety bundle designed to reduce racial disparities in maternal morbidity and mortality. While not specifically addressing racialized actions in care, the bundles offer opportunities for providers to more routinely review data on the magnitude of inequities within the hospital and larger health-care systems, and to learn about bias and root causes of inequities, improve patient communication, and address fragmentation of care across the reproductive life course. While AIM's work is promising, some shortcomings include that the bundles do not address racism explicitly and they are strictly voluntary.

Research and Data Collection

In order to determine the extent of equity in system processes, service provision, and maternal health outcomes, we must examine whether data are utilized to blame Black women or to drive equity. In recent years, the push to analyze data with a health equity lens has been stifled in some maternal mortality and morbidity review committees (Yale Global Health Justice Partnership, 2018). By contrast, some maternal mortality review committees (MMRCs), such as in Mississippi, New Jersey, Oklahoma, and North Carolina, have sought legislative approval to conduct interviews with family members and community members to better identify gaps and prob-

lematic themes in service provision (Building U.S. Capacity, 2019). For women who have survived a near miss, or experienced a severe maternal morbidity event, this broader community engagement invites their perspectives and treats the crisis of maternal deaths as part of a larger dynamic in care interactions. Looking solely at mortality as an outcome, or forming an interdisciplinary team without community representation, are all branches of the same tree of disregard perpetuated in maternal health. Forming mutual learning partnerships with communities and utilizing a broader collection process for morbidity and mortality data can help states develop actionable steps for health system reform to mitigate these poor maternal health outcomes.

Decolonize Research

The Black Mamas Matter Alliance (BMMA) Research Working Group, along with its alliance members, has launched an initiative to decolonize maternal health research by introducing a set of principles to guide research done with, for, and by Black mamas (Black Mamas Matter Alliance, 2019). BMMA advocates for equitable approaches to research methodologies using theoretical models derived from Black women and drawing attention to Black women researchers whose research contributions have been largely ignored, despite evidence and proposals of innovative frameworks (Black Mamas Matter Alliance, 2019). Reviews of research funding demonstrate that Black women scholars receive less National Institutes of Health funding than their White peers, despite comparable research productivity, publication record, previous research awards, experience, education and other similar factors (Ginther et al., 2011; Ginther, Kahn, & Schaffer, 2016). This dismissal of Black female researchers translates into limited dissemination of meaningful work led by Black women (Ginther et al., 2011).

Funders should also consider how Black women-centered community organizations build organizational capacity against the backdrop of larger, predominantly White-led organizations, which continuously secure funding to work with and research Black mothers and communities. Funding organizations should conduct internal racial justice and reproductive health equity readiness assessments to create new standards for funding priorities and algorithms to determine whether funding mechanisms obstruct or truly advance racial justice and health equity (Scott, Bray, & McLemore, 2020).

To address persistent, inequitable maternal mortality and morbidity rates, innovative community-driven solutions must be sought out, not simply as supplements to major grantees but as the first line of solution generation and thought leadership. One look at our current research and funding structure for maternal health could suggest that the solutions to maternal health outcomes must necessarily come from larger, predominantly White organizations and research institutions. It is no longer enough to subcontract with organizations representing marginalized communities; funders must make these organizations the leads. This step will ensure development of their frameworks and build institutional capacity to best honor Black women's contributions to maternal health research. Raising the profile of Black women–led research and innovation can occur with funding allocations that acknowledge historical marginalization in the field. With a Request for Application (RFA) released in February 2020, the National Institute of Health (NIH) Office of Research on Women's Health recently took steps to fund historically overlooked researchers in the field of maternal and infant health in geographic areas experiencing high rates of maternal and infant mortality (Notice of Special Interest, 2020). Continuing historical patterns in funding and organizational investment reinforces the message that knowledge and solution generation for maternal inequities must come from outside the communities most impacted.

Structures and Policies

In early 2020, Congresswomen Lauren Underwood and Alma Adams, Senator Kamala Harris, and members of the Black Maternal Health Caucus developed and introduced the Black Maternal Health MOMNIBUS Act of 2020 to address Black maternal mortality and advance birth equity. The MOMNIBUS Act aims to address gaps in current law that contribute to inequities in Black maternal health. Building on legislative foundations like the Midwives for MOMS Act, designed to diversify the midwifery workforce, and the MOMMAs and Helping MOMS Acts, which focus on extending Medicaid coverage into the one-year postpartum time period, the MOMNIBUS Act consists of nine bills to comprehensively address the Black maternal mortality crisis. Key to the MOMNIBUS Act is inclusion of the leadership, scholarship, and advocacy from Black women–led

organizations and communities historically marginalized in co-developing policies that impact communities.

The MOMNIBUS package will advance equity by investigating the social and structural determinants of health that impact maternal health outcomes, funding research on maternal health outcomes in incarcerated women and veterans, examining community-based models and programs, and providing support to mental health and substance use treatment for moms. The MOMNIBUS Act is visionary in its efforts to look deeply into the supporting structures that affect a woman's reproductive future and outcomes (Black Maternal Health Caucus, 2020).

Conclusion

Forging a path toward birth equity requires visionary leadership to shift and restructure organizations and longstanding practices. Examining and reckoning with the harms committed by organizations in power requires courageous leadership. Previous generations of public health and medical leaders envisioned our current health system. As public health leaders, we have the power to envision systems that support all people. The opportunity to create and cultivate leaders who can bring us closer to the vision of birth equity exists. Doing so requires that we are honest about the impact of decades of racist, biased policies and beliefs about Black women and our desire to uphold new frameworks and principles that support the achievement of equity for all birthing women.

Organizations complicit in perpetuating maternal health inequities must commit to leadership that can restructure these systems. The maternal health field must seek visionary leaders who will strive to shift federal legislation, overturn provider education practices, consider new funding patterns, and find new opportunities to shift the landscape with representative research and policies that will guide organizations through the task of systemic culture change.

Joia A. Crear-Perry, M.D., F.A.C.O.G., is a physician, policy expert, thought leader, and advocate for transformational justice. As the founder and president of the National Birth Equity Collaborative, she identifies and challenges racism as a root cause of health inequities. Dr. Crear-Perry currently serves as a principal at Health Equity Cypher and on the Board of Trustees for Black Mamas Matter Alliance, Community Catalyst, National Clinical Training Center for Family Planning, and the University of California/San Francisco Preterm Birth Initiative. Highly sought-after as a trainer and speaker, Dr. Crear-Perry has been featured in national and international publications, including Essence and Ms. Magazine, honored by USA Today in its "Women of the Century" series, and featured on ABC Nightline's *Hear Her Voice*.

Carmen Green is the vice president of research and strategy at the National Birth Equity Collaborative, creating solutions that optimize Black maternal and infant health through training, research, policy advocacy, and community-centered collaboration. As a state policy fellow at the Center on Budget and Policy Priorities, she focuses on health policy, long-term care support, and predatory lending to Louisiana's low-income families. A writer, reproductive justice activist, and doula, Ms. Green created Hazel Green, LLC, in 2017 to build capacity for Black-owned community-based programs and family services. Her work represents a continued commitment to honor the ancestors by serving Black families with vision and joy.

Inas Mahdi, M.P.H., focuses on immunization program evaluation and special projects as the CDC's public health advisor to the Georgia Department of Public Health. A birth equity research scholar with the National Birth Equity Collaborative, she oversees anti-racism trainings and policy/program assessment with ob/gyn clinicians. Working across sexual and reproductive health, she has conducted research focused on preventing sexually transmitted infections and HIV, intimate partner violence, and global maternal and child health in the global South and throughout the African diaspora. Her research has also involved adolescent pregnancy prevention, women's health issues in refugee camps, and behavioral health in schools and she has been involved with cholera outbreaks in Haiti and the Ebola epidemic in West Africa. As a member of the research working group of the Black Mamas Matter Alliance, Ms. Mahdi helps to expand maternal health research through health equity, Black feminist and womanist theory, and epidemiology concepts.

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"Any effort to understand and address the crisis of maternal mortality must include a focus on Medicaid, the role it has played, and the role it can play in the future."

— JENNIFER E. MOORE, PH.D., R.N., F.A.A.N. and
KAREN DALE, M.S.N., R.N.

Medicaid and Maternal Health: A National Crisis at the Intersection of Health Systems and Structural Racism

Jennifer E. Moore, Ph.D., R.N., F.A.A.N.
Karen Dale, M.S.N., R.N.

Introduction

Medicaid plays a critical role in the health of low-income, reproductive-age (ages 15–49) women. More than 25 million women are covered through Medicaid, approximately 70% of whom are of reproductive age (Kaiser Family Foundation, 2017). Nearly half of all births in the United States are covered by Medicaid, with the share in each state ranging between 20 and 71% (Medicaid And CHIP Payment and Access Commission, 2020; Kaiser Family Foundation, 2020a). Medicaid is also the funding source for 75% of all publicly funded family planning services (Kaiser Family Foundation, 2017). Any effort to understand and address the crisis of maternal mortality must include a focus on Medicaid, the role it has played, and the role it can play in the future.

The United States has among the highest rates of maternal mortality in the developed world, with a disproportionate number of Black women accounting for the majority of deaths. For every maternal death, more than 94 women, an estimated 52,000 women per year, experience severe maternal morbidity. In addition to contributing to inequitable health outcomes, these disparities increase health-care costs. In one analysis of 14 states, an estimated $114 million to $214 million of savings to Medicaid would be realized if racial and ethnic disparities in maternal outcomes, such as rates of preterm birth, preeclampsia, and gestational diabetes, were reduced to the benchmark levels of the lowest racial/ethnic group (Zhang et al., 2013). The rate of severe maternal morbidity is 1.4 times higher for Medicaid-covered deliveries than for with women with commercial insurance coverage (Fingar et al., 2018). Yet among deliveries to Black women, there were no differences in rates of severe maternal morbidity outcome between Medicaid and commercially covered births (Brown, Adams, George, & Moore, 2020).

Risk factors for maternal mortality and morbidity among those enrolled in Medicaid are multifaceted and complex. This paper discusses risks associated with unstable insurance coverage, unmet social needs, and care models that do not meet the needs of birthing women. Many of these are rooted in structural racism. For example, Black and Hispanic women are more likely to be uninsured or have Medicaid coverage, have limited or no access to midwifery-led care, lack community-based support such as doulas, deliver at a hospital with worse quality of care, face individual-level stressors such as racism in the clinical setting, or be affected by the accumulation of such discrimination, racism, and stressors over their lifetimes (Howell et al., 2020; Martin et al., 2018).

Medicaid Eligibility and Coverage

By federal law, all states must provide Medicaid coverage to pregnant women with incomes up to 133% of the federal poverty level (FPL), with some states establishing more expansive criteria (Adams et al., 2003; Gifford et al., 2017). The FPL in 2020 for a family of three was $21,720 in annual income (HealthCare.Gov, n.d.). The median income eligibility limit for pregnant people was 200% of the FPL in 2020. Three states and the District of Columbia have eligibility levels above 300% of the FPL and twenty-three states have levels below 200% of the FPL (Kaiser Family Foundation, 2020a).

At the time Medicaid was enacted, eligibility for it was limited to individuals receiving cash assistance, which did not include pregnant women. Not until 1986 could state Medicaid programs extend coverage to include pregnant people and infants living in poverty, and in 1988 this coverage became mandatory. In 1989, Medicaid coverage was expanded again to include pregnant people and children under age six with incomes up to 133% of the FPL (Centers for Medicare and Medicaid Services, 2015). States that had already expanded coverage above those levels were prohibited from lowering them, but otherwise, there have been no mandatory increases in federal eligibility for pregnant individuals in the last 30 years.

As enacted, the Affordable Care Act (ACA) would have expanded Medicaid coverage to all adults with income below poverty, which includes a large number of individuals of child-bearing age before and after they are pregnant. However, with the U.S. Supreme Court's decision that Medicaid expansion should be optional, this coverage is limited to women in the 38 states and District of Columbia that have chosen to expand Medicaid. In states that have not expanded Medicaid, including large states such as Texas, Florida, and Georgia, poor women of child-bearing age are not eligible for Medicaid unless they meet specific criteria, such as being pregnant, having custodial children, or having a disability.

Federal law requires that Medicaid coverage include, among others, hospital care, physician care, and services delivered at Federally Qualified Health Centers. Federal law considers coverage of prescription drugs to be optional, but all states have elected this option. While Medicaid's covered benefits are generally quite comprehensive and the same for everyone who is eligible, a provision of the ACA permitted states to offer a narrower benefit package for adults made newly eligible under the law. That benefit package aligns with requirements for commercial insurance to cover 10 essential benefits, one of which is pregnancy services. The ACA also requires coverage without cost sharing for all preventive services recommended by the United States Preventive Services Task Force with a grade of A or B (Stolp & Fox, 2015). This includes services such as well-women visits, interpersonal violence screening, and lactation support. The Public Health Services Act Section 2706, within the ACA, provides that health plans cannot discriminate against any licensed or certified provider, such as a certified nurse-midwife. The ACA also includes provisions related to freestanding birth centers under Section 2301, requiring all states with licensed or otherwise state-approved birth centers to cover birth center services under Medicaid.

Despite these provisions, states have found ways to prevent those enrolled in Medicaid from accessing high-value, evidence-based maternal models of care. Medicaid coverage of maternity services from nonphysician providers such as midwives, and out-of-hospital births such as at freestanding birth centers, varies by state and is dependent on licensure and credentialing laws (Gifford et al., 2017). Midwifery-led care, doula support, and freestanding birth centers have become a luxury limited to mostly White women in the United States with commercial insurance coverage or who can afford to pay out of pocket. Ultimately, Medicaid-covered pregnancy services vary greatly across the country with southern states generally offering fewer benefits.

Medicaid Financing and Delivery

The Medicaid program is jointly financed by federal and state governments. Federal contributions are defined by the Federal Medical Assistance Percentage (FMAP), which reimburses states for 50% to 82% of the state's Medicaid expenditures (Medicaid.gov, n.d.). The formula provides higher rates to states with lower per capita income and lower rates to states with higher per capita income. Certain populations and services have separate federal payment levels. For example, family planning services are reimbursed 90% by the federal government, and costs associated with those made newly eligible for Medicaid under the ACA are reimbursed at 90% by the federal government, down from 100% in the early years after enactment.

Medicaid is administered by states and territories operating under federal guidelines issued by the Centers for Medicare and Medicaid Services (CMS) with the U.S. Department of Health and Human Services (HHS). Although federal Medicaid laws set broad standards for coverage and benefits, many program components are optional and at the states' discretion. Of particular note, provider payment rates and the use and structure of managed care are areas where state choices dominate.

Pregnant individuals with Medicaid coverage typically receive care in private solo or group practices, Federally Qualified Health Centers, and hospital outpatient department clinics. These services can be paid through capitated managed care arrangements or fee-for-service, depending on the state. In the past three decades, the trend among state Medicaid agencies has been to contract with managed care organizations (MCOs) with the rationale of presumed cost savings,

improved access, coordination of services and supports, and continuity of care. In 2016, 68% of all individuals enrolled in Medicaid were members of a Medicaid MCO (Ahn et al., 2018). MCOs are responsible for managing cost, utilization, and quality for individuals receiving benefits from their health plan. The Medicaid program represents a delegation of networks and benefits administered by the state through risk-based, capitated, per member per month payments to the MCO.

Many uninsured women become eligible or are presumed eligible and are first enrolled in Medicaid as a condition of their pregnancy. After confirming the pregnancy, the provider may help enroll the eligible individual in the Medicaid program. If the state requires it and the provider participates, individuals may also enroll in an MCO that will cover their services through the state-defined postpartum period.

Racism in Medicaid

In 1935, President Franklin D. Roosevelt proposed a social security program that would create a universal financial safety net. Southern states expressed opposition, fearing that federal assistance provided to Black primarily agricultural and domestic workers would upset the existing racial hierarchy and economic order. Through a series of debates and negotiations, Roosevelt conceded, resulting in the exclusion of domestic workers and agricultural laborers from the 1935 Social Security Act. As a result of this exclusion, 60% of Black men and 80% of Black women were not afforded the benefits of the safety net initiative (Wiesen Cook, 1999). By the 1960s, state and local administrators of Aid to Families with Dependent Children (AFDC, commonly referred to as "welfare") used statutory discretion to extend benefits only to those living in "suitable homes" as a way to exclude Black households, particularly those led by never-married women, from public assistance.

In 1964, President Lyndon B. Johnson proposed a series of new programs termed the Great Society, including Medicare and Medicaid. Opposition came from the American Medical Association and the chair of the House Ways and Means Committee, Congressman Wilbur Mills (D-AR), whose well-known racist beliefs were evident in his 1956 support of the Southern Manifesto, which argued in support of maintaining White supremacy in the United States (Martin, 1998). As part of the political com-

promise that led to its passage, Medicaid took effect with eligibility tied to states' AFDC eligibility standards. This stood in contrast to the universal entitlements of Social Security and Medicare. Similar to recent experience with the ACA, participation in the new Medicaid program was optional to states, with primarily southern states waiting years to join the program. The disparate approaches of states, infused with racially driven politics, continue to this day. As of 2015, when 30 states had expanded coverage, Black Americans were twice as likely to fall into the coverage gap (people who would be eligible if their state expanded Medicaid) than White Americans (Artiga, Damico, & Garfield, 2015).

Despite gradual expansion of federal Medicaid eligibility standards for children and pregnant women, as well as the formal separation of Medicaid eligibility from cash welfare as part of welfare reform signed into law by President Bill Clinton in 1996, historical structures, many tied to racist policies, remain firmly in place. To varying degrees, states have adopted heavy paperwork requirements, frequent eligibility redeterminations, confusing and inaccessible application processes, and, more recently, work requirements to constrain enrollment and sustain a vision of the program as only being available to the "deserving" poor, with "deserving" defined as conformity to the beliefs and preferences of political leaders.

State flexibility, a legitimate value that promotes program design and administration that reflects local circumstances, is a defining feature of the Medicaid program. The degree of allowable flexibility is a matter of ongoing debate, particularly since the federal government pays the majority of the program's costs. The neutral-sounding term "flexibility" is often used to perpetuate policies with racist roots, akin to the invocation of "states' rights" during the Civil War and the civil rights movement.

Barriers to Equitable Coverage and Access

Despite relatively comprehensive covered services, pregnant people enrolled in Medicaid face barriers accessing high-quality care early in pregnancy and in the postpartum period due to a variety of factors, including eligibility and coverage gaps and unmet social needs, which often arise from implicit bias and racism. These barriers create an inequitable health system that ultimately affects health outcomes.

Eligibility and Coverage Gaps

Churn, defined as a pattern of disruption in insurance coverage, has a direct impact on pregnant individuals enrolled in Medicaid (Sommers et al., 2016). Many individuals first become eligible for Medicaid during pregnancy and lose coverage 60 days postpartum. In an analysis of nationally representative survey data, half of those who were uninsured nine months before the month of delivery had acquired Medicaid or Children's Health Insurance Program (CHIP) coverage by the month of delivery. Approximately 55% of individuals with Medicaid coverage at delivery experienced a coverage gap in the following six months (Daw et al., 2017; See also Daw et al., 2020). Gaps in care limit access to postpartum services, including essential mental health screening and treatment and family planning. As a result, individuals experiencing churn may have an increased risk of postpartum complications and missed opportunities for care that could affect future pregnancies.

Avoiding churn and providing continuous Medicaid coverage during the postpartum period, commonly referred to as the fourth trimester, is critical to avert poor outcomes. In 2018, the American College of Obstetricians and Gynecologists (ACOG) released new recommendations that included providing continuous care for 12 weeks postpartum instead of one visit at six weeks postpartum (American College of Obstetricians and Gynecologists, 2018b). According to a Centers for Disease Control and Prevention (CDC) report of pregnancy-related maternal mortality reviews between 2008 and 2017 in 14 states, more than two-thirds of the deaths were preventable (Davis, Smoots, & Goodman, 2019). *Preventability* was defined as at least some chance of a death being averted by one or more reasonable changes to the patient, community, provider, facility, or system factors. Nearly half of the documented maternal deaths occurred after hospital discharge, and one-quarter occurred after six weeks postpartum, which is approximately when many women enrolled in Medicaid lose coverage (Davis, Smoots, & Goodman, 2019). Given that around 50% of maternal mortality occurs after the day of delivery, establishing policies that allow states to extend Medicaid coverage for individuals of low income through the first year after childbirth—beyond the 60-day cutoff point that many states utilize—has the potential to reduce adverse maternal outcomes. Health-care coverage has the potential to improve rates of follow-up care and increase appropriate interventions for women who are at high risk of postpartum adverse outcomes (Stuebe et al., 2019).

Unmet Social Needs

Unmet social needs, including environmental, political, socioeconomic, and behavioral barriers, affect a pregnant individual's ability to access maternity care. A recent study examining experiences of pregnant Black women found that three categories of factors were barriers to accessing care (Mazul, Ward, & Emmanuel, 2017). The first included structural factors such as challenges obtaining and maintaining Medicaid coverage, identifying clinicians who accept Medicaid, and having reliable and affordable transportation to and from medical appointments. The second encompassed psychosocial stress, including relationship or legal challenges, lack of social support, and experiences with racism. The third factor was attitudes and perceptions. Ambivalence about the pregnancy and not finding value in the medical appointments are examples of attitude factors (Gadson, Akpovi, & Mehta, 2017).

Group prenatal care models, such as Centering Pregnancy, designed to improve patient education and provide social support, have the potential to address some of these unmet social needs (American College of Obstetricians and Gynecologists, 2018a; Cunningham et al., 2017; Craswell, Kearney, & Reed, 2016; Rising, 1998). Community-based maternal models of care—which combine the specific pregnancy,

labor, and postpartum expertise of doulas with the community and cultural connections of community health workers—may also have a positive impact on pregnant people. Community-based maternal care professionals provide valuable services, including home visiting during and after pregnancy, labor support, and encouragement of bodily autonomy that are linked to improved birth outcomes (Gadson, Akpovi, & Mehta, 2017; Institute for Medicaid Innovation, 2020; Bohren et al., 2017; Sama-Miller et al., 2018). Group prenatal and community-based models are particularly effective in reducing preterm birth among low-income Black women (Carter et al., 2016; Ickovics et al., 2007), yet most individuals enrolled in Medicaid are unable to access services provided by doulas and maternal community health workers due to lack of coverage. Most doula and maternal community health worker programs for the Medicaid population are funded through short-term, small community grants or MCO pilot projects that are limited to a select group of pregnant and birthing people.

Implicit Bias and Racism

Implicit bias and racism also affect access to high-value, evidence-based care. *Implicit bias* is defined as unconscious and automatic attribution of particular qualities to a member of a racial, cultural, or social group that might have an effect


on clinical care (Byrne & Tanesini, 2015). Implicit bias may not reflect one's belief system and therefore may not be conscious to the person who holds it. However, such biases might unconsciously influence treatment plans and recommendations. A review of implicit bias in clinical decision-making suggests that clinicians have unconscious preferences for certain types of patients, (e.g., White, thin) and implicit biases against other groups, particularly people of color and obese individuals (Chapman, Kaatz, & Carnes, 2013). A systematic review examining implicit bias scores found that clinicians' implicit bias against Black, Hispanic/Latino/Latina, and dark-skinned individuals affected patient interactions, treatment decisions, treatment adherence, and health outcomes (Hall et al., 2015).

Furthermore, there is growing recognition that chronic exposure to racism has an independent negative effect on maternity outcomes (Dominguez, 2008). The cumulative effect of life stressors—often referred to as allostatic load—is a significant contributor to poor outcomes. The Black Mamas Matter Alliance report, *Setting the Standard for Holistic Care of and for Black Women,* identifies and amplifies the maternity care knowledge, legacy, and work of Black women. The report includes recommendations for increasing and improving holistic maternal care, including listening to Black women, recognizing the historical experiences and expertise of Black women and families, providing care through a reproductive justice framework, and disentangling care practices from the racist beliefs in modern medicine (Black Mamas Matter Alliance, 2018).

Need for a Holistic View

We are at the early stages of a comprehensive understanding of the interplay between health equity, churn, unmet social needs, bias, and racism on outcomes, especially in the Medicaid population (Institute for Medicaid Innovation, 2019). While each of these barriers to high-quality, equitable care needs to be addressed individually, these challenges reinforce themselves and must be tackled in a holistic, intersectional way.
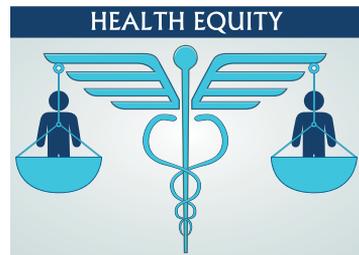
Improving Care

Pregnant people enrolled in Medicaid face significant challenges obtaining the high-quality, evidence-based care that is most likely to yield favorable outcomes. The majority of births in the United States are low- to medium-risk and appropriate for high-value, evidence-based maternal models of care, such as midwifery-led care and freestanding birth centers. Yet the majority of pregnant people enrolled in Medicaid currently do not have access to or coverage for these models of maternity care (Alliman & Phillippi, 2016; National Institute for Health and Care Excellence, 2015).

Underutilization of appropriate care models is a problem that confronts all women in the United States, but it places a particular burden on those enrolled in Medicaid. Medicaid enrollees are unable to purchase their own way into alternative or preferred care models. They are likely to have less choice in selecting their providers, settings for care, or health systems than their commercially insured counterparts. Given the role of racism that is compounded by economic strain, they are more likely to have unmet social and health needs that, if left unaddressed, yield worse birth outcomes.

Fortunately, there are opportunities to improve access and coverage to high-value, evidence-based maternal models of care—such as midwifery-led care and freestanding birth centers—for all people, including those with Medicaid coverage. While these models will not eliminate structural racism in Medicaid, health systems, or communities, they offer an important counterbalance that has been shown to improve birth outcomes. Furthermore, they offer culturally congruent, person-centered, respectful, and high-quality care that pregnant and birthing people of color are demanding through organizations such as the Black Mamas Matter Alliance, Birth Equity Collaborative, Sister Song, and Birth Center Equity Fund.

Midwifery-Led Care

The midwifery-led model of care promotes physiologic birth, which involves understanding, facilitating, and avoiding interference with the body's natural, physiologic birth process. This model relies upon shared decision-making and respect for an individual's cultural needs, comfort, and privacy. Emphasizing the normalcy of birth, those employing a midwifery model generally avoid practices such as continuous fetal monitoring that might lead to further interventions. Instead, they rely upon intermittent fetal auscultation and nonpharmacologic pain management techniques when safe and desired (American College of Nurse Midwives, Midwives Alliance of North America, & National Association of Certified Professional Midwives, 2013).

Midwifery-led care is not limited to the prenatal, intrapartum, and postpartum periods, but extends well beyond to include preventive screening and services, family planning, well-women, and peri- and menopausal care. It should be acknowledged that many components of the midwifery-led model of care are not exclusively practiced by midwives and have been incorporated by practicing physicians, most notably family practice physicians, into the care they provide. There is a critical role for family practice physicians working in rural areas to have expertise in both the midwifery-led model of care and obstetrics to ensure optimal outcomes.

Midwives work in a variety of settings—such as hospitals, alongside birth centers, freestanding birth centers, and homes—in partnership with physicians and health systems. Currently, about 9% of all births in the United States are known to be attended by certified nurse-midwives. However, the number is likely higher because of underreporting as a result of various state and facility policies (e.g., incident to billing) that do not capture the services of certified nurse-midwives in birth reports (Freytsis et al., 2017; Declercq, 2015; Walker, Schmnuk, & Summers, 2004).

Since 1989, when U.S. birth certificates were revised to include a checkbox for midwife-attended deliveries, there has been a steady increase in reported midwife-led births. The overwhelming majority (98.5%) occur in hospitals (Declercq, 2015). Although home births in the United States increased by 71% from 2004 to 2014, the increase has been relatively small, from 0.56% of all births in 2004 to 0.96% in 2014, with very few among the Medicaid-covered population (MacDorman & Declercq, 2016).

The safety, quality, and high-value of midwifery-led care has been well documented by research studies over the past 30 years (Heins et al., 1990; Oakley et al., 1996; Shaw-Battista et al., 2011; Johantgen et al., 2012; Nijagal et al., 2015; Altman et al., 2017; Jolles et al., 2017; Weisband et al., 2018; Attanasio & Kozhimannil, 2018). In 2014, The Lancet published a series of papers developed collaboratively by leading experts from multidisciplinary groups on the worldwide contributions of midwifery to maternal and infant health outcomes. The series acknowledged the vital and cost-effective contribution of midwives to high-quality care and projected that scaling up the model worldwide would improve many maternal and newborn outcomes, including mortality and morbidity, concluding that "midwifery is a vital solution to

the challenges of providing high-quality maternity and newborn care for all women and newborn infants, in all countries" (Renfrew et al., 2014a; See also Renfrew et al., 2014b). The series highlighted that childbearing women need more than access to care; they need a combination of skills and relationship-based care. Recognizing the extensive evidence on the value of the midwifery-led model of care, the World Health Organization launched a global campaign in 2020 termed "The Year of the Nurse and Midwife" to raise awareness and encourage adoption of the model to improve birth outcomes around the world (World Health Organization, n.d.).

A large continuously updated Cochrane systematic review of relatively small-scale research studies in midwifery-led care has shown favorable birth outcomes for women with low-risk pregnancies and maintains the recommendation that all women should have access to midwifery-led care (Sandall et al., 2016). Overall, the review has found that women who experienced the midwifery-led model of care were less likely to have regional anesthesia for pain management or experience operative vaginal deliveries, episiotomies, or preterm births before 37 weeks, and were more likely to report a higher rate of maternal satisfaction with their care. A large systematic review had similar findings but also found lower rates of cesarean deliveries, lower rates of third- and fourth-degree lacerations, and higher rates of initiation of breastfeeding (Newhouse et al., 2011).

Larger studies have recently emerged that also demonstrate the benefit of the midwifery-led model of care. A 2018 retrospective study of 8,779 low-risk women found that women who initiated care with a midwife had a significantly lower risk of cesarean (p < .001) and preterm delivery (p < .001) than did those who initiated care with a physician (Loewenberg Weisband et al., 2018). Furthermore, a 2019 study of 23,100 planned hospital births across 11 hospitals in a multicenter quality improvement collaborative between 2014 and 2018 found that midwifery-led care had significantly lower use of intervention compared to obstetricians, including induction of

labor, episiotomy, admission at less than three centimeters, epidural use, artificial rupture of membranes, oxytocin use, and cesarean delivery (Souter et al., 2019).

The presence of certified nurse-midwives as members of interdisciplinary teams with physicians has also been shown to improve birth outcomes in hospitals. A recent large retrospective multicenter cohort study comparing low-risk nulliparous women delivering in hospitals with midwives to women delivering in hospitals staffed only by physicians found a 74% lower rate of labor induction, a 75% lower rate of augmentation of labor, and a 12% lower rate of cesarean deliveries in hospitals with midwives (Neal et al., 2018). Midwifery-led care in the hospital setting depends on more than just the presence of midwives, however; it relies on the collaborative practice of the clinical team. Although there are a variety of approaches, a team-based approach to care is important to increase utilization of this high-value model, particularly for the Medicaid population.

Most recently, the National Academies of Sciences, Engineering, and Medicine convened a special committee to identify some of the common barriers and opportunities in various practice settings for midwives, including hospitals, freestanding birth centers, and home births. The report concluded that all the settings had risks and benefits for either the pregnant individual or the newborn, but the overall evidence is clear that midwifery-led care leads to better birth outcomes and is underutilized, especially for those with Medicaid coverage, in the United States (National Academies of Sciences, Engineering, and Medicine, 2020).

Freestanding Birth Centers

The American Association of Birth Centers (AABC) defines a *freestanding birth center* as a "home-like facility within a health care system with a program of care designed in the wellness model of pregnancy and birth" that maintains an evidence-based model of care and follows national quality and safety standards (American Association of Birth Centers, 2017). In 2017, there were 345 freestanding birth centers in the United States, a number that grew 76% since 2010 (American Association of Birth Centers, n.d.). Midwifery-led care in freestanding birth centers is designed for low-risk pregnancies, representing the majority of pregnancies in the United States, including the majority of those covered by Medicaid. Midwives at freestanding birth

centers work in collaboration with other clinicians, such as obstetricians, in an integrated health system with the capacity for timely transport to the local hospital in the event that the birthing person requires a hospital-level intervention such as a cesarean birth (Bovbjerg et al., 2017).

As noted earlier, Section 2301 of the ACA mandates that all states with licensed or otherwise state-approved birth centers cover these services under Medicaid. Licensure and accreditation of birth centers varies by state. However, licensure is mandatory for Medicaid reimbursement and dependent on adherence to state regulations. Accreditation is voluntary but demonstrates "accountability and dedication to best practices" (Commission for the Accreditation of Birth Centers, n.d.). The accreditation process occurs through the Commission for the Accreditation of Birth Centers (CABC) and/or the Joint Commission. While the Joint Commission serves a wide array of health-care organizations, CABC's focus is solely on birth centers. As of April 2020, 118 freestanding birth centers were accredited through the CABC (Commission for the Accreditation of Birth Centers, n.d).

The freestanding birth center offers low-risk individuals an option to arrive in active labor; receive limited use of medical interventions and support for normal, physiologic birth; and be discharged home several hours postpartum. Although the focus is on evidence-based, low-intervention care to ensure the best birth outcomes, the freestanding birth center is fully stocked with medical supplies, including those needed for an emergency. This birth setting is used successfully in other high-income countries and in 2014 was recommended by the National Institute for Health and Care Excellence (NICE) in the United Kingdom as a valuable option for healthy individuals with normal pregnancies (National Institute for Health and Care Excellence, 2015).

In contrast to European nations where midwifery-led care and freestanding birth centers are well integrated into the health-care system and considered the standard of care, there is a lack of consistent integration in the United States. Recognizing the need for guidance on risk-appropriate care, ACOG, in a 2019 consensus paper, acknowledged that freestanding birth centers are an important part of the health-care system in the United States for low-risk women who are expected to have an uncomplicated birth (American College of Obstetricians and Gynecologists, 2019). Furthermore, ACOG recommended adherence to AABC standards that require birth centers to have an established consultation, collaboration, or referral system in place to meet the needs of the woman or infant.

The Strong Start for Mothers and Newborns Initiative, commonly referred to as Strong Start, was authorized by the ACA and is managed by the Center for Medicare and Medicaid Innovation (CMMI). The initiative sought to address the underuse of evidence-based, nonmedical interventions in care for those enrolled in Medicaid, such as childbirth and breastfeeding support, through midwifery-led models of care, including in the hospital and freestanding birth centers. The evaluation of the five-year program found significantly better outcomes for women receiving care in midwifery-led freestanding birth centers compared with matched population controls, including a decrease in the cesarean birth rate (17.5% vs. 29%, p < 0.01), preterm birth rate (6.3% vs. 8.5%, p < 0.01), and low-birthweight rate (5.9% vs. 7.4% p < 0.01) (Hill et al., 2018). Importantly, costs decreased by 21% for infants in the first year of life and were 16% lower for women receiving care from freestanding birth centers, with the dyad saving an average of $2,010. Focus groups with participants also found higher levels of satisfaction over hospital birth settings.

Furthermore, studies that have evaluated transfer rates have noted that the majority of patient transfers from a freestanding birth center to hospital care were considered non-emergent (Alliman & Phillippi, 2016; Jolles et al., 2017; Stapleton, Osborne, & Illuzzi, 2013). Freestanding birth centers have been shown to provide safe, high-quality, evidence-based care for the Medicaid population with significantly improved outcomes. However, few pregnant and birthing people in Medicaid have access to or coverage for midwifery-led care in freestanding birth centers.

States with regulations that allow midwives to practice to the full extent of their training and license have a larger nurse-midwifery workforce and a greater proportion of certified nurse-midwives who attend births (Yang, Attanasio, & Kozhimannil, 2016). These states also have overall better birth outcomes, such as lower odds of a cesarean delivery, preterm birth, and low birthweight, compared to states with more restrictive regulations (Stapleton, Osborne, & Illuzzi, 2013). One study created a scoring system for midwifery integration within each state based on several factors, including scope of practice, autonomy, and prescriptive authority. States identified as having the highest level of integration of midwives across all settings also

had higher rates of spontaneous vaginal delivery, vaginal delivery after cesarean section, and breastfeeding initiation. They also had lower rates of cesarean and preterm birth, low-birthweight infants, and neonatal deaths (Vedam et al., 2018).

The Economics of Midwifery-Led Care in Medicaid

Efforts to increase access to and use of midwifery-led care models in Medicaid must address current financial barriers that exist due to Medicaid's payment practices.

Reimbursement for Midwifery Services

Medicaid reimbursement for covered certified nurse-midwife services is allowed in all states and the District of Columbia (Kinzelman & Bushman, n.d.). To process reimbursement, midwifery services may be billed directly using the midwife's own National Provider Identification (NPI) number, or the midwife may bill under a supervising physician's NPI number as an "incident to" billing. Incident to is defined as

services or supplies furnished as an integral, although incidental, part of the physician's personal professional services in the course of diagnosis or treatment of an injury or illness (Centers for Medicare and Medicaid Services, 2016).

When the requirements for "incident to" billing are met—meaning that the midwife has rendered service in collaboration with a physician—reimbursement is based on 100% of the physician's contracted fee schedule amount. When services are not shared or split between a physician and a midwife, the midwife-covered service is reported under the midwife's NPI number, and Medicaid payment may be reduced.

In addition to the services required under the ACA's Women's Health Preventive Service Guidelines, each state Medicaid agency, in collaboration with CMS guidance, determines the service codes that are covered as reimbursable benefits for those enrolled in Medicaid (Health Resources and Services Administration, 2016). The actual dollar amount to be reimbursed for each service is often derived from the Medicare fee schedule. For example, a state may determine a Medicaid service code will be reimbursed significantly more (120%) or significantly less (60%) than the Medicare fee

schedule. This amount is typically established for all providers including physicians, nurse-midwives, and nurse practitioners in the state.

However, nurse-midwives in 22 states receive less than 100% of the established fee, compared to their physician colleagues, creating a disincentive to bill their services separately (Kinzelman & Bushman, n.d.). Although a midwife may be licensed to function independently, accepting the oversight of a physician and using "incident to" billing practices in which a nurse-midwife provides the service but bills under a physician colleague maximizes their reimbursement.

"Incident to" billing presents a barrier to understanding the degree to which the midwife contributes to improved outcomes since their patient encounter is hidden behind the billing physician and does not appear in claims data that are often used to evaluate the midwife's impact on reducing health care costs and improving outcomes and satisfaction.

For hospital-based deliveries, facility fee charges are billed separately from a clinician's professional services. For example, prenatal and postpartum care and the midwife's time to attend the delivery are billed separately from the freestanding birth center facility fee or the hospital's charges. To be reimbursed by Medicaid, the midwife must also be credentialed as a Medicaid provider by the state and all health plans contracted to provide coverage in the regions where they will be providing services. Although a signed Medicaid health plan contract is an essential step in being listed as an in-network provider, directories might not be regularly updated, and some midwives might find that they are not listed. This makes it challenging for those covered through Medicaid to find a midwife or freestanding birth center that accepts their insurance coverage.

Reimbursement for Freestanding Birth Centers

Hospitals are paid more, oftentimes threefold, than freestanding birth centers for providing the same services for an uncomplicated vaginal birth using the same billing codes (Institute for Medicaid Innovation, 2020). Additionally, while hospitals can bill professional and facility fees for both the birthing person and newborn, a freestanding birth center cannot bill facility fees for newborn care even though it is provided. Furthermore, if a patient is transferred from a freestanding birth center to the

hospital, regardless of the duration or level of care provided before the transfer, the birth center cannot bill for the facility fee. The facility fee is only paid to the entity where the birth occurs, not where resources were expended during labor. This further disincentivizes freestanding birth centers from accepting any insurance payment.

Since Medicaid payment for maternity care services can be as low as 30% of commercial payment rates, the economics for low-volume freestanding birth centers with high personnel costs, malpractice insurance, and other operating and facility costs have driven birth centers to concentrate on self-pay, out-of-pocket payment (Institute for Medicaid Innovation, 2020). If a freestanding birth center accepts health insurance payment, oftentimes they will only accept employer-sponsored commercial payment A freestanding birth center that wants to remain solvent will rarely accept Medicaid.

Conclusion

Despite being the source of insurance coverage for almost half of all births in the United States, Medicaid fails to meet the critical needs of pregnant and birthing women, thereby contributing to the nation's maternal mortality crisis. From limited, unstable eligibility to an emphasis on hospital and obstetrician-led care at the expense of meeting social needs and patient preferences, Medicaid reflects weaknesses that permeate the health care system. Given the economic and social disadvantage of the population Medicaid serves, these weaknesses translate into human suffering and lives lost. Only by emerging from its racist roots—which cause Medicaid to treat coverage as a scarce good given only to the "deserving poor" and treating those covered as unable to define what they need—can Medicaid live up to its potential as a source of financing for high-quality, appropriate maternity care that respects the preferences and needs of pregnant and birthing people, with the ultimate effect of reducing severe maternal morbidity and mortality.

Jennifer Moore, Ph.D., R.N., F.A.A.N., is an internationally recognized leader in Medicaid and maternal and child health. As the founding executive director of the Institute for Medicaid Innovation and assistant research professor at the University of Michigan medical school's department of obstetrics and gynecology, Dr. Moore focuses her efforts on strategically bringing together payers, clinicians, researchers, and government to design and evaluate innovative approaches to address pressing health issues. Her research interests include Medicaid managed care, mental health services for pregnant women, and models of care to improve maternal health care delivery and patient outcomes in Medicaid. She has more than 25 years of experience gained in roles of increasing responsibility at the Agency for Healthcare Research and Quality and national nonprofit organizations.

Karen Dale, R.N., M.S.N., is the market president for AmeriHealth Caritas DC, one of the largest Medicaid managed care organizations in Washington, DC. She leads initiatives that strategically position the organization as a market leader with innovative solutions for the critical challenges faced by its members. She serves as board chair for CommonHealth ACTION, a board member for both Volunteers of America National Services and the Volunteers of America National Board. In addition, she serves on the District of Columbia State Innovation Model Advisory Committee.

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REVERSING THE
U.S. MATERNAL MORTALITY CRISIS

A Report of the Aspen Health Strategy Group

The mission of the Aspen Health Strategy Group is to promote improvements in policy and practice by providing leadership on important and complex health issues. The group is comprised of 23 senior leaders across influential sectors including health, business, media, and technology, and is part of the Health, Medicine and Society Program at the Aspen Institute. Co-chaired by Kathleen Sebelius and Tommy G. Thompson, both former governors and former US Secretaries of Health and Human Services, the Aspen Health Strategy Group tackles one health issue annually through a year-long, in-depth study. This compilation is a collection of papers on the group's fifth subject: maternal morbidity and mortality. The papers provide an overview of the crisis and address related topics on the U.S. maternity care system, racism and racial inequity in affecting maternal health outcomes, and the role of Medicaid in both understanding and tackling the problem. It also includes a final consensus report based on the group's work.

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